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THE DIRECTIONS OF THE APPARENT VERTICAL AND HORIZONTAL MERIDIANS OF THE RETINA AND THEIR MODIFICATION FROM PHYSIOLOGICAL AND PATHOLOGICAL CAUSES, WITH A DESCRIPTION OF THE CLINOSCOPE.

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(*Four figures in the text.*)

Comparison of Data Regarding Retinal Meridians.—If the point of regard of the two eyes is fixed in the median and in the horizontal plane and at infinite distance, while the head of the observer is in the primary position, it might be assumed that the vertical meridian of each retina would coincide with a plane perpendicular to the plane of regard and that the horizontal meridian would coincide with the plane of regard.

Yet in respect to a proposition so apparently simple and involving questions of great importance, practical as well as theoretical, the views of the ablest investigators have been at variance; for while Helmholtz concedes that the horizontal retinal meridians so nearly coincide with the plane of regard that they may be considered as practically identical with it, he characterizes the vertical meridians as *apparent* vertical meridians, and he reasons from his own experiments, and those of Volkmann, that these apparently vertical meridians as a matter of fact, in normal eyes, converge downward to the extent of $1\frac{1}{4}°$ each, making thus an angle between the vertical meridians of the two eyes of $2\frac{1}{2}°$ with the lower extremities of the meridians approaching each other.

Basing his calculations on this proposition and on the law

of Listing, Helmholtz deduced his remarkable demonstration of the horopter in its various positions.

Meissner also found a tilting of the apparent vertical meridians, but worked out a different theory of the horopter.

Hering, however, found no convergence of the vertical meridians and of course arrived at a conclusion quite different from that of Helmholtz.

A subject of great physiological interest then has been thrown into confusion by the variation of data from which learned and conscientious investigators have drawn their conclusions. It has become the custom of recent writers to mention the subject of the horopter as one having no physiological value, or even to speak of it with a measure of disdain. The illustrious Helmholtz has been accused of a waste of time on his own part, and a demand for a waste of energy on the part of his disciples in their attempts to follow his analytical reasoning and his abstruse mathematical formulæ.

We shall make no mistake if we regard this subject to which Helmholtz devoted so much time and research as one which, when rightly comprehended, is of weighty interest to the practical ophthalmologist, and that it is by no means a subject of scientific curiosity only.

Leaning of the Vertical Meridians in Paralyses.—There is another field of research in respect to the position of these vertical and horizontal meridians which will perhaps appeal more directly, in the present state of our knowledge, to the practical ophthalmologist, and that is in regard to the degree and direction of their tilting in cases of paralysis or paresis of the motor muscles of the eye. At present, in the diagnosis of paralysis of these muscles, it is customary to observe the fact of the tilting of images, but of the exact extent little or no notice is taken. Although there are means of arriving at a rough estimate of this leaning, I believe that in no textbook on ophthalmology is it recommended to employ even these rude methods.

It may also be a subject of practical interest, indeed in certain cases it is such, to determine the extent of torsion which a patient may be able to induce and especially to de-

termine, as far as possible, the muscles on the action of which the torsion depends. Yet we have no satisfactory and convenient means for determining this torsion, nor have we satisfactory means of developing the control of patients over the function.

We have thus various inducements to a greater facility in the theoretical study and the practical examinations of the relative positions of the vertical and horizontal meridians of the eyes.

The Plane of Regard in Different Individuals.—The question of the normal adjustment of the plane of regard of the individual with respect to the primary position of his own head when the minimum of nervous energy is directed to the muscles of the eyes, has never been taken sufficiently into account in the experiments of those who have interested themselves in the problems of corresponding points of the retinas and of the horopter, yet here is an element of great, in fact of essential, importance in the investigation. Daily experience with the use of the tropometer shows that many persons have the eyes normally so adjusted that in a passive state the plane of regard, the head being in the primary position, would be materially and often excessively above the horizontal plane. It is not unfrequently the case that repeated and well conducted examinations show that the normal deviation above the horizontal plane reaches from 8° to 10° of arc, and in some instances these figures express only a part of the truth. There is another large class of persons who show as clearly that the deviation of the plane of normal direction is materially below the horizontal plane.

It need hardly be said that, in an investigation in which the law of Listing plays the principal rôle, such peculiarities must be taken into consideration, and that, in the absence of a due regard to the normal plane of direction as shown by the tropometer, there can be, as there have been, only confusion and results of uncertain value from the researches of investigators.

The first element of accuracy in these researches then must be a knowledge of the relation of his normal direction of regard to the horizontal plane on the part of the observer.

If an observer should be subject to the condition which I have called anophoria,[1] that is, a condition in which there is a tendency for the eyes when not under the exercise of the will to deviate upwards, and if with this tendency there should be a necessity for slight convergence, then in the primary position the vertical meridians, supposing them to be vertical, should, according to the law of Listing, take substantially the position which was recognized by Volkmann and Helmholtz.

Should the observer, on the other hand, be subject to the opposite condition, should the normal direction be below the horizon, the vertical meridians (still supposing them

[1] As the terms Anophoria, Anotropia, Katophoria, and Katotropia will appear repeatedly in this discussion, it will be proper to define them. They were first suggested as expressing the conditions referred to in this article in a series of articles commenced in *Annales d'Oculistique*, April, 1895, and concluded in the number for July, 1895.

In those articles it was shown that, irrespective of the condition which had been known as hyperphoria (a tendency of one visual line to rise above the other), there were very many cases in which both eyes were so adjusted that with the minimum of nervous and muscular impulse the visual plane would fall materially below, or rise materially above the plane of the horizon, while the head is exactly in what is known as the primary position.

In moderate cases, in which the tendency of both visual lines is to rise above the plane of the horizon or to sink below it, no deviation of each eye singly upwards or downwards can be detected when a card is slipped before one or the other while the eyes are directed in the horizontal plane. But if the patient is examined by the tropometer the upward rotation of both eyes is found either excessive or deficient. To such cases the terms Anophoria (a tending upwards of both visual lines) and Katophoria (a tending downwards of both visual lines) were applied.

These include by far the greatest number of cases of the class of conditions in which the eyes are not normally adjusted for the horizontal plane.

There is a lesser number of cases in which, if the subject of the examination is caused to look at a distant object in the horizontal plane and a card is slipped in front of either eye, that eye will be seen to rise above the other or to fall below it, giving for the moment a vertical squint, with the covered eye deviating from the line of regard in the vertical direction up or down, and with the deviation of each eye in the same direction. If one eye rises under such circumstances and the other falls there is a different condition, known as Hypertropia, but if each of the two rises or falls as above described, the condition is known as Anotropia (a turning of the visual lines upward) or Katotropia (a turning of the lines downward).

It will be seen that the distinction between Anophoria and Katophoria on the one hand and Anotropia and Katotropia on the other is one of degree rather than one of kind. In the first the eyes can not be seen to deviate up or down, in the last the deviation is plainly seen.

In cases in which the eyes are adjusted for the plane of the horizon, the rotation upwards is about 33° of arc and the downward rotation about 50°. In Anophoria the rotation upward is in excess of 33°, often about 40°, and in Katophoria it is somewhat less than 30°. In the condition of Anotropia the upward rotation often reaches 55° of arc, and I have seen a few cases even more extreme. In these, however, a lateral squint usually results.

really vertical) should tilt outwards and downwards; while one who had an adjustment of the eyes for the horizontal plane and with no heterophoria, would, the supposition remaining as above, find no deviation of the meridians in either direction.

Thus it becomes not only possible but quite probable that the conflicting results of the study of the horopter may have been the outcome of the ocular peculiarities of those who have attempted it, and that these peculiarities are such as one accustomed to the use of the tropometer observes daily and which may be accurately determined. They may, therefore, be introduced as elements in the problem.

Requisites for Determining the Position of Meridians.—Passing now to the consideration of the means for determining the position of these meridians, we find from what has preceded that certain requisites are essential. They are:

1st. A knowledge on the part of the observer of the adjustment of his eyes in respect to anophoria or katophoria and a due allowance for the influence of this condition in respect to the direction of the plane of regard in making the experiments.

2d. A means by which the exact position of the head may be known and maintained. The head-rest which I have devised for the tropometer will serve this purpose. By means of this instrument two selected points of the cranium serve as fixed points, so that various observers are enabled to make exactly the same adjustment of the head, an essential condition, but one for which no provision has been previously made.

3d. The blending or the comparison of the images in the field of regard of the two eyes should be accomplished with the lines of regard of *the two eyes parallel.* This cannot be accomplished by the use of the ordinary Brewster's stereoscope, for this demands a distinct convergence of the optic axes. The same is true generally for those who have not exophoria in fixing the eyes in such a way as to blend stereoscopic images without the aid of an instrument. The majority of such persons, when they succeed in blending the stereoscopic images without instrumental aid, do so by

converging the eyes to a point one half the distance of the point of regard.

The Clinoscope.—For the accomplishment of all these conditions I have devised the instrument which I am about to describe and which I have called the *Clinoscope.* This instrument appears to meet the demands not only of the physiological investigator in his theoretical researches in respect to the horopter, but supplies a means for practical examinations of the retinal meridians, the necessity for which has not been hitherto felt and for which no provision has been made.

The instrument appears to me to be essential to all the investigations to which I have referred, and by its use we shall, I doubt not, be able to establish such correct data as to enable us to harmonize the conflicting views of the inquirers who have left the subject of the horopter to be regarded, not as a subject of practical importance, which it is, but as an individual peculiarity varying with the experimenter, and therefore of little, if any, physiological interest. By correct methods of examinations into the phenomena the subject may be placed, where Helmholtz believed it should be, on a firm basis of scientific accuracy and uniformity.

FIG. 1.

The instrument (Fig. 1) consists of two hollow cylinders, each about 2.50 centimetres in diameter and one half metre in length. The tubes are mounted on a brass platform, which holds them firmly in the same horizontal plane at a distance

of 6.50 centimetres between the centres at the fixed points. The attachment to the platform permits the tubes to be adjusted in parallelism, in convergence, or in divergence in the plane of the platform. The platform is attached by a movable joint to the upright standard, so that the instrument may be given any desired dip, and a scale and pointer indicate, as in the case of the clinometer, the dip with respect to the horizon.

The tubes are rotated upon their longitudinal axes by means of thumb-screws, as seen in the figure, and a pointer and scale at the upper side of the tube marks the rotation with accuracy.[1]

At the proximal end of each tube is a clip in which, if desired, the observer may insert a glass for the correction of his refraction or any glass from the trial case.

At the distal end is another clip and provision for maintaining precise positions of the diagrams to be used in the investigation. These diagrams are haploscopic figures calculated to aid in the various experiments which may be made. These may be varied according to the wish of the investigator.

Below are represented two pairs of these diagrams. They are designed on ground-glass, but they may be made on thin paper and applied to glass disks.

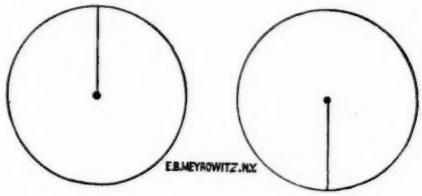

FIG. 2.

Fig. 2 represents two pins, one to be seen by each eye. As the trained observer looks into the tubes the two disks blend and the two pins unite as one long pin, but with the

[1] Since this article was written a form of clinoscope with magnifying lenses, but in other respects the same as here described, has been constructed. The advantages of the lenses, however, are doubtful.

head in the middle of its length. As the upper part of this united image is seen by one eye and the lower part by the other eye, each component of the long pin will appear vertical when that part of the line is brought to coincide with the vertical meridian of the corresponding retina. An adjustment of the tubes by rotation on the long axis will show the true direction of the meridian, vertical or horizontal (depending on the position of the diagrams), of each eye upon the scale above the tubes. Fig. 3 represents another

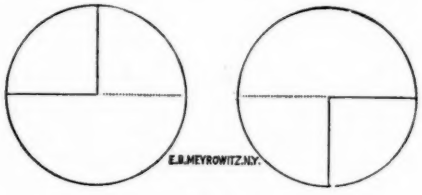

FIG. 3.

pair of diagrams in which both vertical and horizontal lines are included in the combined figure. In the disks themselves the lines represented here by black dots consist of a series of faint red dots. The perfect union of both the vertical and horizontal lines in a given plane would indicate a corresponding direction of the vertical and horizontal meridians in that plane.

By the aid of such figures the trained observer is able to perfectly unite the figures before the two eyes without the aid of convergence or divergence and without the assistance of mirrors or prisms. By means of the adjusting screws experiments may be made with the visual lines directed in the plane of the horizon, above or below it and at any given inclination in these directions. Also in case the observer is exophoric or esophoric, or for other reasons which may occur to him, the tubes may be adjusted in divergence or convergence, and in case of hyperphoria a correcting prism may be placed in a clip next the eye.

All these exact conditions being observed, we may repeat the experiments of Volkmann and Helmholtz in regard to the lines of correspondence with an elimination of

the elements of error which were involved in their investigations.

The inquirer, learning from the use of the tropometer the peculiarity of his own adjustments with respect to the horizon, adjusts the dip of the clinoscope to conform to his own normal plane of regard. Suppose that his rotations are found to be for the positive ascensional (upwards) 40° of arc, for the negative ascensional (downwards) 43°. My observations have shown that the positive ascensional rotation should be 33°, and the negative ascensional 50°. This being correct, it is evident that the adjustment of the observer in this case is for a plane 7° above the horizon, and the clinoscope must be correspondingly adjusted while the head is prevented from accommodating itself to this adjustment by being held in place by the tropometer head rest.

Are the Apparent Vertical Meridians really Vertical?—I shall designate the inclinations of the retinal meridians which Helmholtz describes as "converging and descending," etc., as *declinations*, positive (+) and negative (−). These declinations will be recorded on the scales above the tubes, and when the declination is + the pointer will be directed externally to the 0° point, and when − internally to that point. Thus, in case of a result corresponding to the "converging and descending" inclination of the apparent vertical meridian, as found by Volkmann and Helmholtz, the pointers will indicate, Declination, + $1\frac{1}{4}$° each.

In my own case, after a great number of examinations, continued through many years, I have failed to find even a slight degree of esophoria, exophoria, or hyperphoria; and examinations made since the introduction of the tropometer have not shown a material departure from the standard which I have mentioned above. Thus, the experiment in my own case in regard to the direction of the apparent vertical meridians should be conducted with the tubes of the clinoscope directed horizontally, and with the head in the primary position, the glabella and the depression in the superior maxillary bone just below the nose being exactly in a vertical line.

Under these conditions, with the diagrams of Fig. 2 I find

no declination of the meridians as shown by the pointers on the scales; indeed, the slightest movement from the 0° mark by either of the pointers is usually instantly detected.

If, on the other hand, the tubes are directed downwards 20°, in order to bring the lines of the two tubes into one line exactly vertical and straight, the pointers may require to be moved slightly out, giving a + declination. The declination is — if the tubes are directed upwards to a corresponding extent. But in either case it is very slight, and sometimes no declination follows the tilting of the tubes. If, however, I produce an artificial hyperphoria, placing a prism of 4° or 5° with its base down before either eye, a declination of the lines at once occurs and to a marked extent.

The principle holds good in cases of persons whose eyes are normally directed above the horizontal plane (anophoria), or below that plane (katophoria). In the first class the declination, if at all manifested when the plane of regard is in the horizontal plane, is + for each eye if the two eyes are similar, but if they differ, the eye which is best adapted to fixation at the distance of the diagrams will sometimes require the pointer of the tube through which that eye sees to be at the 0° mark while the other pointer will register a declination of one or more degrees. A marked condition of hyperphoria will exaggerate the declination according to the rule. If the instrument is inclined to the horizon in conformity with the excess of upward rotation, the registration is either at 0° or more nearly approaching it than when the instrument had no inclination to the horizon. That it sometimes still shows some declination would appear to indicate that the full degree of anophoria or hyperphoria has not been determined and corrected. Corresponding phenomena are observed in katophoria.

When the question of a perfect union of exactly vertical and exactly horizontal lines simultaneously in the clinoscope is investigated, my own observations do not correspond with the results obtained by Helmholtz. In the experiments of Helmholtz, when two horizontal lines blended there was not a blending of lines exactly at right angles to them. Thus it

was necessary for him, in order to obtain perfect and simultaneous union, to give to the vertical lines an inclination converging and descending of $1\frac{1}{4}°$ for each eye. In my own case, with the clinoscope the red dots in the diagram Fig. 3 are exactly in the solid horizontal line, while the vertical lines are completely and firmly blended.

A much more difficult test, but one which will be perhaps more satisfactory to one who is skilled in such inquiries, is that of the well known diagram of Helmholtz, which is reproduced here on the diminished scale necessary for use in the clinoscope (Fig. 4).

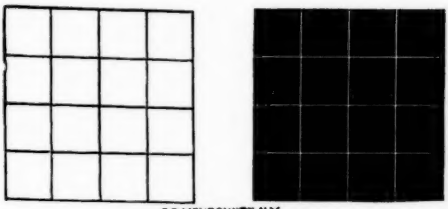

FIG. 4.[1]

On the theory that the horizontal retinal meridians are really horizontal, and that the apparent vertical meridians converge in descending $1\frac{1}{4}°$ each, he constructed this diagram, in which the vertical lines are given, the declination corresponding to the assumed declination of the retinal meridians. In case the vertical meridians actually tilt to the extent of $1\frac{1}{4}°$ each, the vertical and horizontal lines of the two sides of the diagram should blend perfectly and remain blended.

I have never been able under normal conditions to hold both these sets of lines together at the same instant while the plane of regard is horizontal and the figures are at right angles to it; for if the attention is given to uniting the vertical lines the horizontal lines are not perfectly united but have an inclination equal to that overcome for the vertical lines. If the union of the horizontal lines is maintained

[1] Although the engraver has represented these diagrams in quadrilateral form, they should be in circular form similar to Figs. 2 and 3.

there is a declination of the vertical lines which separate thus V. This declination is, in the diagrams of the size here represented and at the distance of one half-metre without an instrument or at the distance of the clinoscope when it is used, exactly equal to the diameter of one of the lines, so that, for instance, when the horizontal lines are maintained in exact union, a vertical black line which at its upper extremity is in contact with the white line, and at its right, will at its lower extremity touch the white line but on the left side. Thus the black line crosses from the right side to the left in the distance of the length of the lines. It is also interesting that, although the union of the black and white squares always gives the effect of lustre, no such effect is ever perceived, even at the centre, where the lines are superimposed as the result of the blending of the vertical lines when the horizontal lines are blended.

I am, however, able to induce a condition with the clinoscope in which a very close approximation to a union, if not an absolute union, of all the lines can be effected. If I place a prism of about 4° with its base down before either eye, thus causing an artificial hyperphoria of about that amount, the images of the tubes separate for a moment but soon unite and when union of the disks is effected the vertical and horizontal lines of the two sides become almost, if not quite blended. In what manner a declination of one set of lines should be induced, while the other set is subject to no change, is not altogether clear, but it is certain that the two sets of lines under these circumstances appear to me to make a more perfect union than when no prism is employed.

A still more perfect blending is effected if the diagram is seen through a stereoscope which is so placed that the plane of regard is downwards 20° and the card on which the diagram is printed is inclined away from the observer, making an angle with the plane of regard of about 120°. Under these circumstances the union is almost complete.

The phenomenon is, in this case, not so difficult to explain, for by the rules of physiological optics the horizontal lines would remain unchanged while the vertical lines would un-

dergo a change of direction and with the required degree of the angle of inclination of the card the union should be accomplished.

This principle can be illustrated by a simple experiment varied from that of Meissner. A fine metallic thread is suspended in a good light with a weight at its lower extremity to hold it tense and vertical. The observer, with his eyes at a distance of one foot from the thread which is in the median plane and with the head in the primary position, looks at the thread at a point exactly on the level with his eyes. The thread will appear single only at the point of direct regard, above and below it will be double, crossing like an X at the point of regard.

If we would unite the thread in its whole extent, the weight may be drawn toward the observer so that the thread no longer extends vertically but with its lower extremity nearest the observer. This experiment might at first appear to oppose the view that in looking down the declination of the vertical meridians is inwards and downwards, for the lines diverge from the centre downwards. But it must be remembered that the right-hand leg of the cross is seen by the left eye and *vice versa*.

Carrying the experiment farther, I find that with the thread at the distance of 15 inches and with the gaze in the usual direction of reading, the thread doubles until its deviation is about 45° with the horizon. Thus it would appear that for eyes adjusted in the position of my own, a book or manuscript should rest at an angle of about 45°. If the page is laid flat on the table the head must be carried forward, or if the page is raised to a position nearly perpendicular with the horizon the book must be raised to the level of the eyes before the confusion is arrested.

As a matter of clinical experience, I find that persons having the condition of anophoria combined with hyperphoria, and especially if with these conditions there is a tendency to exophoria, the vertical meridians have a positive declination of from 1° to 3°. On the other hand, with katophoria and a similar combination of conditions there is a negative declination. In some cases of very consid-

erable hyperphoria the declination reaches a still higher degree.

The Horopter from the Practical Point of View.—The position of the corresponding points of the two retinas being determined, the points in space which may present themselves simultaneously upon these corresponding points of the two retinas may then be also determined. The total of the points upon which images in a given fixed position of the eyes can fall upon corresponding points of the two retinas is called the *horopter*. All objects perceived at these corresponding points are seen single, but objects the images of which fall upon non-corresponding points are seen double. The proportional extent of the field of view in a given position of the eyes in which images are seen singly is less than that in which they are seen doubly, yet it is only when examinations of a critical nature are made that the perception of the double images is recognized.

The horopter resolves itself in all situations not into a large flat or concave field but into lines. In certain situations these lines resolve themselves into a portion of a circle and a straight line. In other situations, with the necessary declinations of the retinal meridians, these lines of the horopter become exceedingly complicated in respect to their direction.

It is not the purpose of this paper to discuss the details of the horopter and especially not to enter upon a solution of its technical situations in the various positions of the plane of regard. It will suffice for our present purpose to point out some of the practical considerations attending this subject.

The position of the horopter of Helmholtz, occupying the ground on which we walk, notwithstanding the opinion of Helmholtz that this would be an extremely favorable position, would in fact be a most unfavorable one; for an individual with the horopter thus located would be forced, in order to obtain clear vision in the path in which he walks, to look directly at the horizon with the head erect. Such an adjustment of the head and eyes would be quite imprac-

ticable. In practice, a person having a declination of + 1¼° each eye would find it necessary, when directing the eyes to the ground at 10 or 15 feet in advance of him, to carry the head in front and bend forward in order to avoid too strong a depression of the plane of regard in relation to the head. And this is exactly the position taken in walking of persons who have the condition of anophoria, especially if it is associated with even slight hyperphoria.

On the other hand, those who have unequal katophoria walk with the head tilted back, the chin high in air, in order, doubtless, to adjust the position of the eyes for a horopter lying in the path they are about to tread.

It is not, however, in walking that the position of the horopter is most important. It is at the distance of and in the direction of reading and of work in the position of reading that the most urgent necessity for a favorable position of the horopter may be found. The subject of anophoria, especially of unequal anophoria, one whose eyes are adjusted high and with the complication of hyperphoria, must carry the head far over the page in order that the depression of the plane of regard may be accomplished without the greater contraction of the depressor muscles of the eyes which would be demanded were the head held only slightly inclined.

To such a person, with the head in a position nearly upright, the images of horizontal lines seen by the two eyes would be inclined to cross and thus cause confusion. To avoid such confusion the head must be thrown far forward or an irksome voluntary effort directed to the torsional muscles must be brought to bear.

The position of the horopter is also and in a corresponding manner unfavorably modified in cases in which too great effort is required on the part of the elevator muscles in order to adjust the eyes for a given plane of regard.

The muscles which principally influence torsion are, notwithstanding their comparative size, less able to exercise constant exertion than those which act in a more direct manner upon the vertical and lateral movements. Hence a position of the horopter demanding considerable torsion

through the influence of the oblique muscles is a position resulting in fatigue and often in pain and exhaustion.

In the case of one whose eyes are adjusted for the horizontal plane and who has no heterophoria, the horopter, with the head in the primary position and the gaze directed in the horizontal plane, will be in the circle of Müller and in a line which extends from the ground upwards. Practically this may be regarded as a straight line but in fact it is a portion of a circle which cuts the circle of Müller. If the gaze is directed downward, as in walking, with the objective point a few feet in advance, the horopter will be in the position supposed by Helmholtz to be the normal one for the direction of the eyes in the horizontal plane, that is, the ground on which we walk. For in that case there will be a convergence with a depression of the gaze and a resulting rotation on the optic axes and at the distance at which one would usually look in walking, the declination of the retinal meridians would be about $1\frac{1}{4}°$.

If the eyes are adjusted (as they are in a very large proportion of those having very vertical profiles, an extreme of the condition known to anthropologists as the *orthognathous face*) with the visual lines tending above the horizontal plane, it becomes necessary, or, at least, conducive to the ease of seeing to bend the head forward to a marked extent in order to avoid an excessive action of the depressor muscles and the consequent tilting of the vertical meridians. This tilting if not excessive, and in the case of those who have excellent torsional powers, may be neutralized while the head is carried nearly erect. Yet in extreme cases of anophoria and especially in those cases which reach the condition of anotropia, in which either eye may be seen to deviate upwards if covered, while the other is directed to a distant object in the plane of the horizon, the carriage of the head far in advance and bent downwards is imperative in walking or working. Such exceptions as come within this rule will be mentioned as we proceed.

On the contrary, the chin must be raised in order to locate the horopter along the ground in the case of marked katophoria or katotropia. The facial lines of these katophoric

persons are as well marked as those of the anotropic class. With katophoria we find as a rule a "weak" chin and strong facial angles. The profile is more or less that known by anthropologists as *prognathous.*

Exceptions to the general rule for the carriage of the head have been mentioned. These may occur in the condition of anophoria or katophoria. In some conditions of extreme upward tendency of the eyes and especially with more or less exophoria in which there is a marked difference in the upward rotations, on account of the difference of the two eyes in relation to the plane of regard and the tendency to diverge, it becomes more easy in certain positions for these people to adjust for the lower of the two eyes than to correct by torsion the marked declination of the vertical meridians which occurs in certain other relations of the visual axes. Even in these cases the carriage of the head is much of the time characteristic according to the rule. A similar class of reasons sometimes influences the carriage of the head against the usual rule in the condition in which the visual plane is normally depressed.

Torsion and its Psychological Effects.—Movements of the eyes which are habitually associated may, by an effort of the will, be isolated.

When the eyes are turned to one side and upwards or downwards there occurs also an apparent rotation on the optic axes. This peculiar apparent rotation of the eyes is rarely made as an independent movement, for it depends upon the passing of the eyes from one fixed position to another and the consequent change in the relation of the cornea to the cranium. But there is required in directions of the line of regard other than these oblique directions just mentioned an actual turning upon the optic axes. Thus, in directing the gaze upward with much or little convergence or downward with convergence of any degree, this rotation on the optic axis—torsion—occurs.

It is a fact long familiar to students of physiological optics that this power of torsion may be demonstrated in a number of ways, convenient among which is that of uniting two linear figures with the stereoscope and giving to one of

them a gradual turn. The images will for a time continue united, but at length, when the rotation of the figure has been carried as far as the rotation of the eyes on the axes can follow, the images will separate. If, while the images of the two sides of the stereoscopic card are held united, but when the parallelism of the vertical and horizontal lines is, to a considerable extent, lost, the observer closes the eyes for a moment and then opens them, the images will be seen double with the vertical lines diverging above or below. After a little, the images may again adjust themselves and complete union may be re-established.

While the rotation thus demanded may be isolated from the movements with which it is usually associated, it is not, under ordinary conditions, possible to isolate the action of a single pair of muscles for its production.

That the oblique muscles play the principal rôle in the act of torsion, under circumstances such as have been mentioned, is unquestioned. They are not, however, the only agents in the rotary movements for the superior and inferior recti lend important aid in the act.

Many well known experiments show that the greater the convergence and the greater the depression of the plane of regard, the greater will be the angle of declination of the retinal meridians. In convergence with depression of the plane of regard, the vertical meridians will converge below, forming an angle thus, V; while in convergence with elevation of the plane of regard, the angle will be reversed, thus, Λ.

These phenomena occur when the eyes are normally approximately adjusted for the horizontal plane without the aid of voluntary effort. In very well marked anophoria or katophoria the results may not be uniform with the rule as just stated.

Under approximately ideal circumstances then, in convergence with depression, the eyes rotate outwards upon the optic axes, while in convergence with elevation they rotate inwards. Supposing the eyes to be absolutely free from the condition of anophoria or katophoria, there should with convergence in the horizontal plane, the head being exactly

in the primary position, be no torsion. In most persons, however, there is an inclination, when examining a line of any length, to permit the attention to pass toward the lower part of the line and thus we have reported results, even where there may be no anophoria, which are due to a depression of the plane of regard simultaneously with convergence. With the use of the clinoscope, this error of observation is, of course, eliminated.

The rotation which inclines the upper extremity of the vertical retinal meridian inwards is effected by the superior oblique and the superior rectus, while the inferior oblique and inferior rectus combine their action in tilting the vertical meridians outwards.

It is impossible, while all the muscles are active to determine the proportionate influence of any individual muscle in the act. In the case of paralysis of one of the oblique muscles or of one of the vertically acting recti, a somewhat closer estimate may be made, but even then, while the corresponding muscle of the opposite side remains intact, there is, necessarily, an important element of uncertainty. A complete paralysis of all the oblique muscles, the others retaining their function, or of all the vertically acting recti under corresponding circumstances would be required to eliminate the sources of the error incidental to the question of proportionate influence of each of the muscles concerned in the torsional rotation.

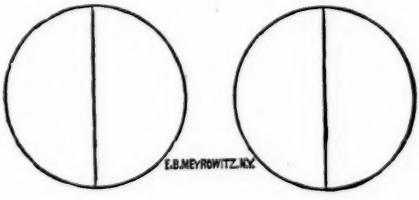

FIG. 5.

As to the extent to which torsion can be carried, it is greater in convergence than in parallelism of the eyes. Hence it is greater when the ordinary form of stereoscope is used in its determination than when the images of the

two eyes are caused to blend without an instrument, or when some instrument is employed which does not, like the Brewster stereoscope, induce a convergence.

For examination of the power of torsion, the clinoscope affords a means attended with a much greater degree of facility and of accuracy than any which has been suggested. In using the instrument for this purpose, the lines which occupy but half the field of each tube are no longer useful, but straight lines crossing the middle of the field and extending to its extremities (Fig. 5) are required.

If the lines are adjusted vertically and the tubes are then rotated each in the positive direction (upper extremities of the lines outwards), the mental conception of the position of the line formed by the union of the two is modified in an interesting manner. As soon as the tubes are thus rotated outward, the line, so long as it is held as a single line, begins to assume a direction approaching the horizontal. The lower extremity points in toward the observer and the upper extremity outwards from the tube. If the observer has good powers of torsion, the line will at length appear to point almost horizontally directly in and out and to be materially elongated, as though it were an arrow to be shot outwards and slightly upwards.

With a good power of torsion, the lines may be held in union until each of the pointers marks + 11°. Thus between the vertical retinal meridians of the two eyes an angle of 22° with its apex down is formed.

If the rotation is carried in the negative direction, a torsion of about an equal extent or possibly 2° or 3° less is induced, and, in this case, the line assumes again an approximation to the horizontal position, now pointing from within outwards, but outwards and downwards. There is a peculiarity attending this rotation of the eye upon the optic axis which is not found in the other rotations. Let us suppose that we wish to learn, for example, the power of abduction in overcoming a prism with the base out. With the object, the flame of a candle at a distance of twenty feet, a prism of 8° is overcome and the flame seen by each eye blends into one. Now it makes little, if any, difference whether in the experiment we use a

prism of 8° before one eye or of 4° before each eye. We cannot exceed the amount of abduction by the use of a prism of 4° before one eye and 5° before the other, any more than we can by replacing an 8° prism before one eye by a prism of 9°.

In the rotation under discussion, however, it is different. If one is able to induce with the clinoscope a torsion of 20° with the two eyes, he cannot, while maintaining the vertical position of one of the lines in the clinoscope, rotate the other to an extent equal to that to which the two were rotated. I find that with one line remaining vertical I can rotate the other either in the positive or negative direction about 14°, which is, however, more than half what I can accomplish with equal rotations of both tubes.

If the right tube remains with the vertical line at 0° and the left tube is caused to rotate outwards, the combined image points outwards, upwards, and to the left. If the left tube is stationary at 0° and the right tube rolls out, the line points outwards, upwards, and to the right.

It is an interesting as well as an important practical fact, and one to which little attention has been given, that horizontal lines can not be held in union while being rotated from the horizontal direction to an extent nearly equal to that in which vertical lines can be held in union. If vertical lines can be held in union with a rotation of 20° or more, horizontal lines become double with a total rotation for both tubes of from 6° to 8°. Indeed, it requires some practice to hold the lines in union with a rotation of each tube either out or in to the extent of 3°.

If the tubes rotate out, the line appears concave, bending outwards at the centre or convex according to the will of the observer. If the rotations are negative the line is convex or concave as before.

Bearing of these Principles on the Horopter.—The fact of the difference in the ability to hold vertical and horizontal lines in union can be seen to constitute an important element in experiments such as those by which Volkmann and Helmholtz investigated the directions of the different retinal meridians. For while there is an imperious necessity for

holding the horizontal lines approximately so in order to unite the two images, a very considerable latitude is permitted in respect to the position of the vertical lines, and the torsional act may overcome an important normal deviation.

The principle holds in stereoscopic vision, that the visual recognition of form and of the third dimension is not the direct result of an instantaneous image formed on each retina, but the result directly, or indirectly, of a series of muscular adjustments. That both form and depth may be perceived instantaneously is true, but doubtless in such instantaneous realizations of the actual dimensions of objects there is a mental acceptance of the phenomena which experience has taught to be the result of impressions received upon the two retinas, provided time is allowed for the usual rapid ocular movements.

The fact of difference in torsion for horizontal and vertical lines has its practical application in many directions. A single example may be introduced here as an illustration of this important principle. The question of the form and proportions of printed type, in order to produce the most perfectly legible characters and a page which can be read with greatest ease, has long interested those who are interested in the progress of the art of printing in its relation to the preservation of the functions of the eyes. Experience has, independent of any theory, taught practical men engaged in the art of typography, that the height of letters must be considerably greater than their breadth. In the ordinary type used in America and England the vertical length of all the letters of a line aggregates rather more than thirty millimetres to every twenty millimetres of breadth of letters. In the French typography the height of the letters is still greater. A little examination of different styles of typography will convince a careful investigator that broad, low letters are less easily held in perfect binocular union than the form more nearly approaching the gothic style.

In what precedes I have gone over a number of somewhat closely related subjects more with the view of indicating the directions in which exact investigations are to be made

than with the purpose of fully discussing either of the topics introduced. The questions relating to the corresponding points of the retinas have been recognized as fundamental to the solution of the problems of the situations and the character of the horopter. If by the aid of the clinoscope combined with the knowledge gained by the tropometer, we can arrive at a more uniform basis of facts respecting the horopter, much will be accomplished.

The observations of the last two years have led me to assign a most important place to the subject of the horopter. That it is a practical subject, ranking by the side of that of refraction, although a much more difficult and obscure field of research, is a conviction which has grown with every month of investigation since its real meaning, the meaning which could only be revealed by the practical use of the tropometer, has been pressed upon my attention.

This is not the occasion and I do not propose here to review the many directions in which the question of the position of the horopter becomes practical. This is a subject which may become the theme of another paper.

PRIMARY SARCOMA OF THE LACHRYMAL CARUNCLE, WITH THE REPORT OF AN ADDITIONAL CASE.

By C. A. VEASEY, M.D., of Philadelphia.

(*With two plates in the text.*)

PRIMARY sarcoma of the lachrymal caruncle is an affection so seldom seen that a report of the following isolated case requires no apology.

B. R., male, aged twenty-six years, consulted me for a small growth situated upon the lachrymal caruncle of the right eye that he had first noticed seven weeks before. At the time his attention had first been directed to it the size was not greater than that of an ordinary pin's head, but at the time of my examination it had become as large as a small green pea. No symptoms had been occasioned by its presence further than a slight irritation at the inner canthus, causing, at times, moderate lachrymation. The growth was attached by a small pedicle, was somewhat redder than the remaining portion of the caruncle and the surrounding conjunctiva, and according to the patient's statement there had been "scabs on it twice." There seemed to be slight ulceration at the time of the examination, but at no time had there been the least pain. No family history of syphilis, tuberculosis, or growths of any kind could be elicited.

The growth was carefully dissected out and the point of attachment thoroughly cauterized with the actual cautery.

After hardening in Müller's fluid sections were made which, when viewed through the microscope, show the growth to be a non-pigmented sarcoma consisting of large and small round cells, with very little intercellular substance. The ulcerated portion

shows very distinctly, and in its immediate neighborhood the mucosa is seen dipping deeply into the growth in a manner not unlike that found in beginning carcinomata. The growth is moderately vascular, the vessel walls being made up of layers of cells, and a few hemorrhages are seen here and there. There is very little pigment found in any of the sections, but all of them show muscle fibres divided transversely and longitudinally.

One year has elapsed since the removal of the growth and there have been no symptoms of recurrence.

In looking over the literature of the subject the following cases have been found.

In 1854 A. von Graefe[1] records a case of "connective-tissue tumor" which had existed one year and had grown to the size of a hazel nut and in which microscopical examination showed symmetrical layers of long and spindle-shaped cells—his description evidently giving it a place among the sarcomata.

In 1873 Gillette[2] reports a case that recurred five times in five years and finally became so large as to interfere with the movements of the eyeball. The right caruncle was the one affected and the growth proved to be a melano-sarcoma.

In 1875 Rydel[3] had a case in which the right caruncle was involved, the growth being about the size of a pea, that proved to be a melano-sarcoma, and notwithstanding the entire removal, it recurred again in the same place in a year's time.

A case was recorded by Del Monte[4] in 1879, the growth occurring in a young child and having been first noticed three or four months before the operation. The right caruncle was the one affected and the tumor was presumed to be due to the use of a strong collyrium. At the time of the operation it was as large as a walnut and by pressure on the eyeball caused the latter to be turned upward and outward and interfered with its movements in every direction. The lids were widely separated and the exposed part of the tumor was more or less rough. The lower and inner third of the cornea was also affected. The tumor was extirpated and was found to have some attachments to the bony wall

of the orbit, but the author states there is no doubt of the origin being from the caruncle. The child died four days after the operation. Microscopical examination showed the growth to be a "telangiectatic fibro-sarcoma," composed mostly of small round cells.

The only other case I could find was that of Despagnet.[6] The patient was a female, aged thirty years. The growth had existed for eight months, was attached by a small pedicle to the left caruncle, was shaped like a mushroom and contained numerous lobules. It was of the color of red wine, and the slender pedicle was about 4 *mm* long and the body about 2½ *cm* long by 1½ *cm* broad. The family history was good. The internal part of the eye was inflamed. After removal of the growth the parts were cauterized and microscopical examination showed it to be a non-pigmented sarcoma.

Thus it is seen, there were two cases of non-pigmented sarcoma (Despagnet's and my own), two cases of melano-sarcoma (Gillette's and Rydel's), and two cases in which the question of pigment is not referred to (Graefe's and Del Monte's). In four of the cases the right caruncle was the one affected, in one only the left caruncle was the point of selection, and in one the seat of the disease is not stated. Early adult life seems to be the age especially susceptible to the occurrence of the affection, and when once begun the growth is extremely rapid. The attachment of the tumor may be by a slender pedicle, thus, to a certain extent, resembling an ordinary polypus, or by extensive adhesions even reaching into the orbital cavity (Del Monte's case). The color is usually of a deeper red than the surrounding conjunctiva and the size varies from that of a pin's head to that of a walnut, or even larger. They are very prone to recur in, or near, the same place after removal, and the microscopical examinations show that the round and spindle-celled varieties apparently occur with equal frequency. The cause in one case was presumed to be the application of a strong collyrium, but in none of the other cases could any cause be ascribed.

Early and thorough removal of the growth as soon as de-

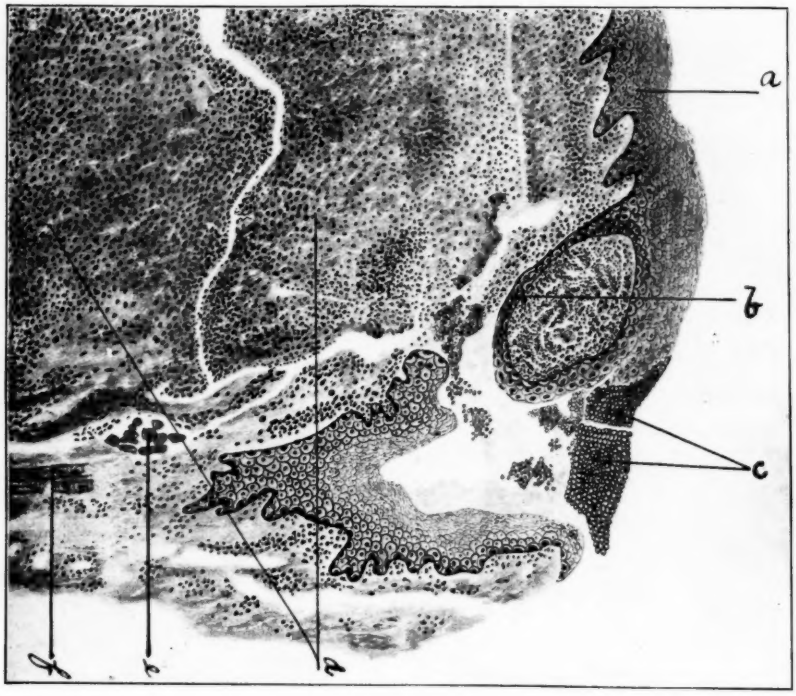

FIG. I.

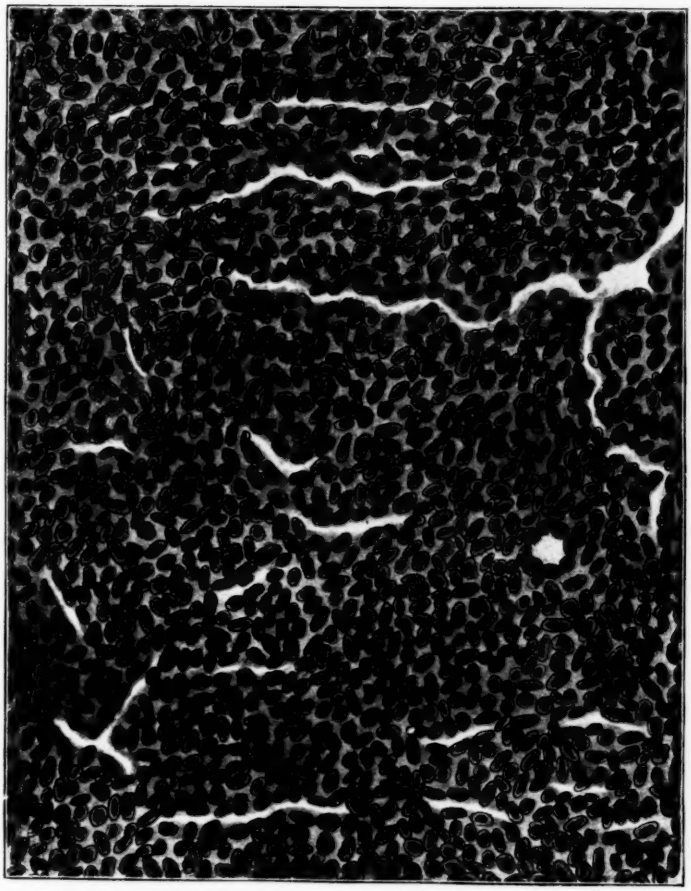

FIG. 2.

tected and, in addition, thorough cauterization of the parts seems to be the best method of treatment.

Explanation of the Plates.

FIG. 1.

a. Mucous membrane.
b. Mucosa dipping into the tumor substance as in beginning carcinomata.
c. The ulcerated portion.
d. The body of the tumor.
e. Transverse section of muscle fibres.
f. Horizontal section of muscle fibres.

FIG. 2.

The magnification is higher, showing the cells, and in the outer portion a transverse section of a blood-vessel.

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GLAUCOMA AFTER CATARACT OPERATIONS.

By Dr. S. C. AYRES, Cincinnati, Ohio.

(*With two charts.*)

THE interest that has recently developed in the study of glaucoma after cataract operations has prompted me to report the following cases with a few comments:

Case I.—Extraction with Iridectomy in both Eyes, Glaucoma Appearing in the one Eleven (?) Years, in the other Twenty Years, after the Operation. Result: Contraction of Visual Field; Deep Excavation of Discs; Nearly Total Loss of Vision.

J. B., fifty-two years, gave the following history: When twenty-three years of age (1867) his *left* eye was operated on by the late Dr. E. Williams for cataract, and eight years later (1875) the *right* eye was operated on by the writer. The von Graefe method was used in both instances, liberal iridectomies being made. He states that he had good vision in the left eye until about eight years ago, when it began slowly to fail. There was no pain or tenderness of the eye, and as the right eye was good he did not miss its failing vision. The *right eye* began to fail in April, 1895, but was free from pain. He paid no attention to this until his vision became so imperfect that he could no longer see to read or do ordinary farm work. In the right eye the line of incision is distinctly visible. The wound had closed perfectly. The depth of the anterior chamber is normal for an aphakic eye. The coloboma is of good size. There is no incarceration of the iris. Oblique illumination reveals a thin membrane extending over the entire area of the coloboma, with the exception of a portion downward and inward, which is perfectly clear. There is an adhesion between this membrane and the inner limb of the iris. The vitreous is somewhat liquefied. There is a deep excavation of the optic disc. T + 1. The field of vision is contracted, as is shown by the chart. V = fingers at 4′.

Left Eye.—There is a liberal iridectomy, but at the inner and outer angles of the incision are cystoid cicatrices. Oblique illumination reveals a membrane extending over the entire area of the coloboma. The optic disc is excavated. T + 1. V = fingers at 6″. The field of vision is shown by the chart. His statement shows that for at least eleven years he had good vision in the left eye, the one first operated on. Then it began gradually to fail, but he could not say definitely how rapidly it failed, as he still had excellent vision in his right eye.

The failure of the right eye is more definite. In the spring of 1895 he noticed he could not see to work as well as usual, but he could still see to read. It was not until the spring of 1896 that he was disabled for work.

It is interesting to observe that the left eye, in which the cystoid cicatrices existed, which are considered safety-valves against increased intra-ocular tension, failed before the right eye where the wound was smooth and solid. Another point of interest is that in the left eye a secondary membrane covered the entire papillary area, whereas in the right one it was not complete. The left eye retained good vision for eleven years after the extraction. The right eye, however, retained very good vision, for he was able to read, for a period of twenty years, before the glaucomatous symptoms began to develop. The ophthalmoscopic appearances of both eyes are just what one sees in ordinary cases of chronic glaucoma. The tension was + 1 in both eyes, and it yielded to eserine, but there was no material improvement in vision.

CASE II.—**Compound Extraction; Glaucoma about Two Years after the Operation. Result: Loss of Vision.**

Mr. K., aged sixty-seven, was operated on for senile cataract of the *right* eye in February, 1883. Extraction with iridectomy. There was some inflammation of the wound following the operation, but it soon subsided, and the patient was discharged with V = 0.2. Six months later his vision was the same, and the eye free from irritation. In February, 1884, a year from the time of operation, his glasses were changed and V = 0.1. There was no pain in the eye, and no increased tension was noted, but there was a secondary membrane in the pupil. He was not seen again

for about a year and a half, 1885, when he returned with the vision *quite abolished* in this eye. The pupil was dilated, tension +1, optic disc deeply cupped and atrophied. There was a small filament or band extending from the inner portion of the ciliary to the pupillary membrane. But the eye was not painful.

In this case vision fell from 0.2 to 0.1 in a year after the extraction, and in about two years and a half he became quite blind. The loss of vision was like that of simple chronic glaucoma. In June, 1886, I extracted the left lens successfully, and he had good vision to the time of his death.

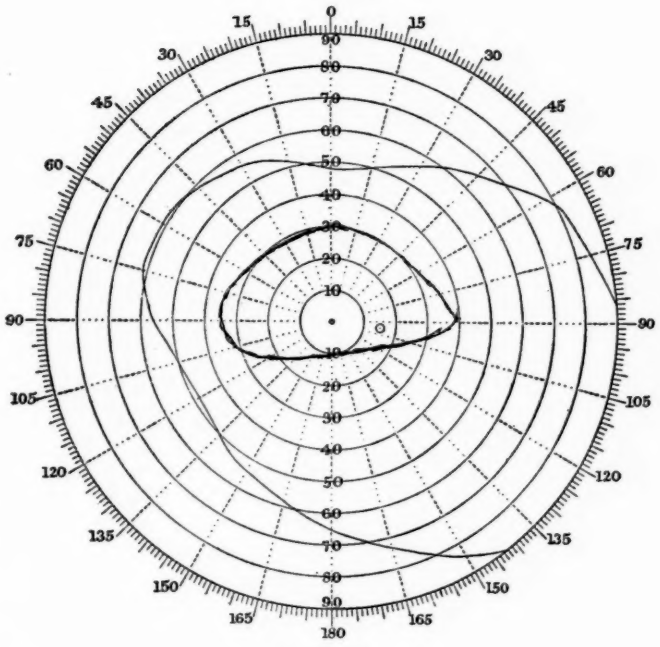
I am indebted to Dr. Geo. H. Goode for this case which occurred in his practice.

Case III.—A Case of Glaucoma after Cataract Extraction in which a Preliminary Iridectomy had been Performed; Iridectomy Gave no Relief; V=O; Enucleation.

Mrs. E., æt. thirty-eight years. Immature cataract O D and O S. The opacity of the left lens was confined to the periphery. With correction, − 1 D sph., V = $\frac{20}{30}$ O S, and $\frac{20}{200}$ O D.

Preliminary iridectomy was performed on the *right* eye early in July, '95. The cataract having matured, extraction was done in the latter part of the following September. Both operations were performed without any unusual incident. The coloboma was of good size and proper shape, and the wound healed after the iridectomy without incarceration of iris. The lens was extracted without accident, and the wound was free from iris and lens capsule. The eye was examined on the third day, when the wound had closed. The patient complained of nothing that would indicate an unfavorable progress, and she was out of bed at the end of a week. About the tenth day there developed a slight amount of iritis which yielded readily, so that she was able to leave the house and come to my office at the expiration of three weeks after the operation. The eye, then, was free from irritation and with + 9 D sph. V = $\frac{20}{40}$. Three weeks later the same good condition existed. However, about one week after the last visit, or seven weeks after the extraction, the patient began to complain of pain. Examination revealed nothing. There was no injection of the eye-ball, and no alteration in the transparency of the media, so that the optic disc was distinctly visible and there was nothing abnormal in its appearance.

RIGHT.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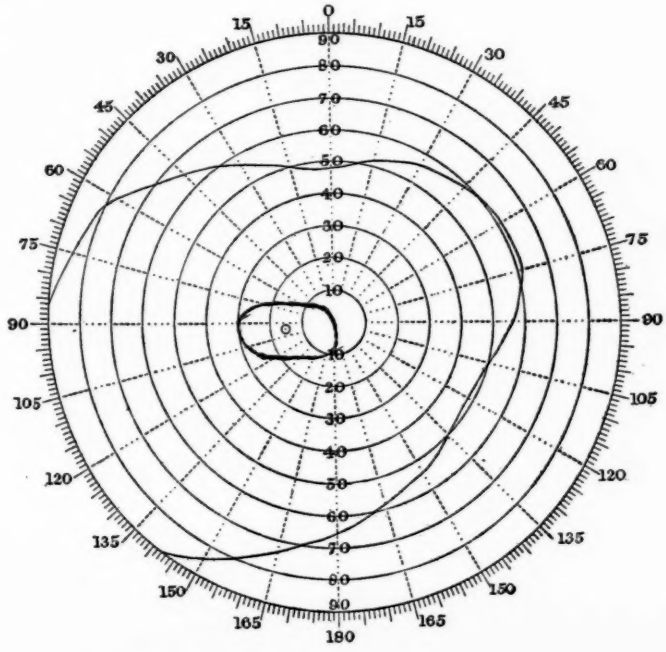
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Tension was not increased. Repeated examinations were made at intervals of five or six days and only upon one occasion was there even a suspicion of an increase in the tension, and a weak solution of eserine was ordered. At the next visit there was an amelioration of symptoms, and fears of glaucoma were dismissed During my absence of three weeks from the city, the eye became more painful, the vision diminished to mere quantitative perception of light, the field of vision was greatly reduced, and tension + 1. With the hope of relieving the pain, an iridectomy downward was made. This effort was not followed by success. Two months later, the eye continuing to be painful and perception of light having disappeared, it was enucleated.

CASE IV.—**Combined Extraction on both Eyes; Acute Glaucoma in one on the Sixth Day; Eserine and Evacuation of Aqueous; Prompt Recovery.**

Mr. M., forty-eight, senile cataract, but eyes otherwise healthy. Both eyes operated upon, an interval of a year intervening. Iridectomies were made in both eyes. About five or six days after the operation on the *left* eye patient complained of pain, and on examination it was found to have plus tension. Atropine had been used. Eserine was ordered, and the next day the wound was opened by a Weber's probe-pointed knife and the aqueous evacuated. This arrested the trouble entirely and the wound healed kindly and he recovered a vision of 0.9. It is now about twelve years since the operation. It seems hardly probable that atropine had any influence in developing an acute glaucoma. There was a liberal iridectomy and the operation uncomplicated.

CASE V.—**Combined Extraction; Glaucoma after Exposure on the Twelfth Day. Four Days later Paracentesis of Cornea, and Eserine; Prompt Recovery.**

Mr. G., sixty-seven, operation for uncomplicated senile cataract. Extraction with iridectomy. Patient remained in hospital a week and then went to stay with some friends two or three days before going home. The operation was smooth, without complication or accident, and he was discharged with V = 0.5. On the journey home he stopped at a station about five miles from his home and drove to his house. It was a cold day and he insisted on going home in a driving snow-storm. The next day he had pain in the eye and his physician wrote me the circumstances

Thinking he had iritis, I advised the use of atropine. Fortunately, I saw him three or four days later and found the ball hard, pupil dilated, cornea cloudy, and vision very much impaired. I immediately made a paracentesis of the cornea and ordered eserine. The glacomatous symptoms subsided and did not return, and he recovered useful vision.

The last two cases may be properly called acute secondary glaucoma, coming on within a few days after operation. In No. 4 it is possible some soft lens substance still remained which swelled sufficiently to excite pain and increase the intra-ocular tension. The rapid subsidence of all unfavorable symptoms and the preservation of excellent vision would rather confirm this theory. In No. 5 the pain in the eye followed exposure to a severe snow-storm about two weeks after the operation. A paracentesis of the cornea was made and eserine used, and this was followed by a subsidence of all the unfavorable symptoms and preservation of useful vision.

In the other cases we have glaucoma coming on in No. 1 in left eye eleven and in the right eye twenty years after operation, in case No. 2 about two years, and in case No. 3 about two months after *successful* cataract extractions.

ISOLATED RUPTURES OF IRIS AND CHOROID.

By Dr. JOHN F. WOODWARD, Norfolk, Va.,

LATE ADJUNCT PROFESSOR EYE, EAR, AND THROAT, UNIVERSITY COLLEGE OF MEDICINE, RICHMOND, VA.

(*With a figure.*)

Mr. J. T., of Southampton County, Virginia, aged thirty, white, healthy, robust, good family history, called at my office, November 10th, to consult me about his eye. The following history was obtained: About two months previous, while driving some cattle through a forest, he was struck in the right eye by a stick or limb. The blow was sufficient to stun him, and on recovering he found that he was blind in his right eye. Thinking this would pass off in a short time, and there being no other discomfort to call his attention to a closer examination, he proceeded with his usual duties. After getting home, however, and finding that his sight did not return, he consulted a doctor in the neighborhood, who gave him some simple eye wash, telling him that his eye would soon be all right.

Status præsens: No external signs of a surgical lesion having occurred, the cornea and conjunctiva were perfectly healthy, but there was a semi-dilatation of the iris. Examination with oblique illumination showed a clear anterior chamber and no signs of a previous hemorrhage, although there was easily seen to the lower and outer quadrant of the iris a tear extending from the pupillary

border to half the width of the iris. There was no evidence of opacities in the lens, although several small threads appeared on the posterior inner border. Upon moving the eye in and out,

there was a decided tremulous condition of the iris (iridodonesis) to the nasal side, suggesting a probable dislocation of the lens. The pupil being dilated, I tried to make an examination with the opththalmoscope, but on account of a dense cloud in the vitreous was unable to make out the exact condition, though I could see that something was wrong with the fundus. I came to the conclusion that there had been a severe internal hemorrhage, and probably some serious damage done to the inner tunics, so refused to give a diagnosis or prognosis. The pupil was sluggish and responded very slightly to light reflex though a mydriatic dilated it *ad maximum*. Vision O D fingers, O S normal. I prescribed for him full doses of iodide of potash and a pilocarpine sweat every other night for two weeks, directing that he return to see me in about four weeks.

December 19th.—Mr. J. T. came to my office, and I found the eye much improved. V = $\frac{20}{30}$ in O D, and with a + 0.5 Cyl. ax. 105, V = $\frac{20}{25}$, O S, V = $\frac{20}{20}$, + 0.25 Cyl. ax. 75 = $\frac{20}{15}$. The iridic tear had contracted some, but the pupil was still dilated, and the iris tremulous. Tension normal, accommodation perfect, and iris responded more promptly to light. No luxation of lens could be detected. The little shreds were still seen on the posterior inner border of lens, but no opacities were noticeable. There were several large floating opacities in the vitreous, and one seemed to have become organized, but gave no trouble in vision. Optic disk was normal and also the fundus, except about one and one half optic-disk widths to the nasal side of the papilla was seen clearly what was an isolated rupture in the choroid, over which the retinal veins and arteries passed uninterrupted. The rupture formed a crescent with its concavity towards the papilla, more pointed at the top and increasing in width as it descended until at the bottom it formed a broad and ragged appearance; in length, about two widths of the optic disk. A pigmented veil spread out from the optic disk to either extremity of the tear, otherwise the fundus was normal.

This case seems to me to present some interesting features as to the result of blows upon the eye without a solution of continuity in any of the outer tunics. In most cases that I have been able to see records of, the rupture of choroid has been upon the temporal side, depending upon the direction of the blow, I suppose, although this was not stated. The

sluggishness of the iris seen in this case is similar to that reported by Leplat in 1891, where he reports a case, and describes this condition as depending upon a paresis of the terminal fibres of both the third nerve and the sympathetic. In my case the rupture of the sphincter iridis was so complete that the shock to the terminal nerves could not be *solely* responsible for the long-continued dilatation of the pupil, but conforms, I think, to the usual result of an iridectomy. Outside of the fact that the continued mydriasis produces some discomfort and blurring of vision, my patient has a good and useful eye, and can get binocular vision as well as he ever did.

SARCOMA OF THE CORNEAL LIMBUS.*

By A. N. STROUSE, M.D.

ATTENDING OPHTHALMOLOGIST TO CITY HOSPITAL, OPHTHALMOLOGIST TO MT. SINAI HOSPITAL OUT-DOOR DEPT., ETC.

MALIGNANT growths involving the eyeball and orbit are of comparatively frequent occurrence and have been the subject of an extensive literature. On the other hand, sarcoma and carcinoma originating from the bulbar conjunctiva and cornea are much more rarely encountered, and I have therefore thought it of interest to bring before you the following case of giant-celled sarcoma and make it the subject of a few remarks, chiefly of a practical nature.

Mary N., aged seventy-two years, was first seen by me in November, 1893, at my clinic at the Mt. Sinai Dispensary, and gave the following history: She had always enjoyed good health, and there was no predisposition to malignant growths in her family, her parents having died at an advanced age. She stated that for several months past the vision in the left eye had been gradually failing, although this was unattended with pain or any other disturbance, while for several weeks the left upper eyelid had been so swollen as to almost entirely obscure her sight, so that she had to be led into the clinic. She also suffered from occasional darting pains in the left eyeball.

An examination disclosed the presence of leucomata of the cornea of the right eye. The left upper eyelid appeared to be pushed forward by some underlying swelling, which rendered it impossible for her to raise the lid. The latter was not swollen or

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œdematous, but tensely stretched over the tumefaction. On forcibly raising the lid, a nodular mass, about the size of a small hazel-nut, presented, having a smooth bluish red, very vascular surface. Its base, which was somewhat constricted, was attached at the sclero-corneal margin. The mass was soft and somewhat elastic. When the eyelid was forcibly pushed upward over the tumor, it was held in this position by the protruding mass, exposing a large extent of sclera and giving the eye somewhat the appearance of exophthalmos. The surrounding parts showed no evidence of inflammation. The loss of vision was entirely due to the position of the growth, which occupied the upper two-thirds of the cornea, obscuring the pupillary space, and when lifted out of the way the sight was at once restored.

In view of the localized situation of the tumor and the entire absence of complications I regarded it as feasible to remove it without resorting to the radical procedure of extirpating the eye. A 4 per cent. sterilized solution of cocaine was instilled several times until complete anæsthesia was induced. The lids being separated by an assistant an attempt was made to fix the tumor with forceps, but this was unsuccessful as the tissues crumbled and tore wherever they were grasped, and free hemorrhage occurred from the lacerated vessels. It was therefore considered advisable to remove the growth as speedily as possible, and for this reason the mass was snipped off with scissors at its base. The bleeding was remarkably profuse, the blood gushing from the severed vessels, completely covering the field of operation and running down the side of the face. I immediately applied pressure which was continued for several minutes, but on removing my finger the hemorrhage recommenced to the same extent. The wound was now cleansed as thoroughly as possible, the blood clots removed, and the entire surface cauterized with the actual cautery. This had to be repeated several times before the bleeding was completely controlled. A firm pressure bandage was now applied and the patient sent home, with directions that should the hemorrhage recur she was to come to my office at once.

Two days after the operation she returned to the Dispensary, and on removing the bandage, which was saturated with blood, the wound was found to be covered with a scab, and no signs of inflammatory reaction were noticed. There was still a little oozing of blood which was easily arrested. Vision was now perfect. The bandage was reapplied after thorough disinfection

of the parts, and at the end of ten days was left off entirely. The patient received an antiseptic wash to instil into the eye several times daily. The wound cicatrized nicely and left a very small scar.

Owing to the friable character of the neopalism I was unable to obtain a specimen for microscopical examination.

I did not see the patient again for eight or nine months, when she returned with a condition almost identical with that observed at her first visit. The tumor seemed somewhat smaller and of firmer consistence, and the base had extended, encroaching upon a small portion of the cornea. Bearing in mind the profuse hemorrhage at the previous operation it was carefully dissected off from the underlying tissue with the knife, and I was surprised to find that comparatively little blood was lost during the operation. To prevent a recurrence of the growth I deemed it advisable to remove, as far as possible, all the diseased structures and, with this end in view, thoroughly scraped the surface with a sharp spoon. I was impressed at this time with what impunity we could operate upon this region of the eyeball, *i. e.*, the sclerocorneal junction, without producing reactive inflammatory symptoms. The wound surface was cauterized with the actual cautery, and a bandage applied as at the previous operation. The patient made a good recovery, with a small cicatrix, and vision again became good.

She was now kept under constant observation, and with the exception of a few small nodules which reappeared at intervals and were treated with the cautery, she appeared to be relieved of the disease. She was again lost sight of until April, 1895, when she returned stating that she was beginning to lose her vision in the same eye. There was a small flat tumor occupying the original site, which however, had encroached further upon the surrounding tissues and which was treated in the same way, the hemorrhage being inconsiderable.

On several subsequent visits the affected area was cauterized, and during one of these cauterizations the adjacent corneal surface was accidentally touched with the cautery point, leaving behind a small opacity, which fortunately did not encroach upon the pupillary space. The patient remained under observation for a long time during which no recurrence took place. On October 6, 1896, she returned to me, stating that her vision was again failing, and an exmination revealed the condition which I shall now demonstrate to you. (Exhibition of patient.)

At the upper and outer portion of the corneal margin there is a flat, soft, pale-red tumor covered by conjunctival tissue. It is somewhat triangular, the apex extending a short distance over the cornea which is traversed at this portion by milky white processes apparently situated just below the epithelium and extending to the pupillary margin. The base spreads upward and loses itself in the conjunctiva. Movements of the eyeball are free, and there is no glandular involvment.

I am indebted to Dr. Hodenpyl for the report on the microscopical appearances of the portions removed. It reads as follows:

"Sections from various parts of the growth have essentially the same characters. Surrounding and making up about two-thirds of the tumor is a coagulum of blood, the outer margin has the appearance of having being dried. The cells composing the tumor are of various shapes and sizes, the predominating cells being large spindle- and large irregular-shaped cells, many of the nuclei of which show mitotic figures. The cells lie in a fine and exceedingly delicate stroma. The tumor is abundantly supplied with delicate thin-walled blood-vessels. No normal structures were included in the mass. Diagnosis: large irregular cell sarcoma. Parenchymatous hemorrhage."

The origin of these neoplasms is ascribed in most instances to a traumatism, a pre-existing pterygium, to a pigmented spot at the margin of the cornea, or to some form of irritation. In Graefe-Saemisch's Handbook it is stated that most of these growths originate in the sclera. The histories of the cases reported, however, and pathological examinations of the affected structures would rather tend to show that they arise from the conjunctiva, or just at the margin where it merges into the cornea. Rumschewitsch, Lagrange, Soelberg Wells, Silex, Benson, Noyes, Burckhardt, all concur in the view that the growth originates in the conjunctiva or at the limbus. Blanquinque reports a case in which the neoplasm was confined to the cornea, and coincides with Gayet (*Dictionnaire Encyclopédique*), who says he does not understand why the cornea should be incapable of producing cancer. In refutation of this view we

may quote Lagrange, who compares the cornea and sclera to tendon, and states that sarcoma of tendon never occurs. This is well illustrated by a case reported by Schwartz as tendon sarcoma, in which a microscopical examination by Cornil demonstrated that the neoplasm originated from the sheath and not from the tendon itself. We may therefore conclude that the cornea becomes secondarily involved, and only so far as its epithelium is concerned, the corneal tissue proper, *i. e.*, the substantia propria, never being attacked.

The attention of these patients is first attracted by the presence of a small pigmented spot which may have existed for a number of years before the appearance of any tumefaction. When the tumor has made its appearance we usually get a history of some traumatism, either accidental or intentional, as in the case of removal of a pterygium, while in other instances we can elicit no history of a pre-existing lesion. As the growth increases in size there occur symptoms of mechanical interference with the surrounding parts. There is present a sensation of a foreign substance in the eye, especially on closure of the eyelids, and still later when the growth has attained larger proportions there is limitation of the movements of the eyeball as well as of the lids, which become fixed either over the tumor, or the latter may protrude and prevent perfect closure of the lids. Pain is absent in most of these cases. Patients tell us that occasionally there is pain of a lancinating character and sometimes a feeling of pressure, which, no doubt, is due to extravasations of blood into the meshes of the tumor. Interference with vision is not complained of until the growth has attained sufficient size to overlap the pupillary space. Loss of vision increases proportionately with the growth of the tumor. Occasionally a hemorrhage occurs externally as the result of erosion of a vessel or of the laceration of the tumor by being caught between the lids during forcible closure, In the early stages the growth seems to be confined to the tissues in the immediate neighborhood of the limbus, and only after a long period are the surrounding structures invaded, in so far that the neoplasm insinuates itself beneath the epithelium of the cornea and extends in the conjunctiva,

Author.	Journal.	Age.	Sex.	History.	Microscopical Examination.	Treatment.	Remarks.
Benson.	*Ophth. Review*, vol. vi., 1887.	11	M.	In 1883 small, movable, dark spot on conjunctiva near cornea. Enlarged in next three years, and is now attached at limbus.	Melanotic tumor with sarcoma-like cells.	Excision of tumor.	No recurrence.
Barrenechea.	*Centralb. f. prakt. Augenheilk.*, vol. xiii., 1889.	52	M.	Slight injury at orbital ridge three years previously; half year later a small growth at edge of cornea, which is now larger than eyeball and extends around to the optic nerve.	Large cell sarcoma.	Exenteration of orbit.	Recurrence. No metastases.
Silex.	*Arch. f. Augenheilk.*, vol. xx., 1889.	63	F.	Black patches at corneal margin for ten years. Hazel-nut-sized, warty, black tumor, for two months.	Melano-sarcoma.	Excision of tumor.	Recurrence of tumor soon after removal, but patient failed to return until four years later. Excision and galvano-cautery. Recurrence two years later; operated one year after.
Silex.	*Ibid.*	64	F.	Round, blackish-blue tumor, with uneven surface at corneal margin for nine weeks.	Melano-sarcoma.	Extirpation of tumor.	Recurrence after about one year; extirpation. Another recurrence with foci in upper lid during same year; removal.
Silex.	*Ibid.*	29	M.	At outer margin of cornea a red spongy growth resembling a pteryguim; existing for three years.	Melano-sarcoma. No involvement of globe. In some places an alveolar structure.	Enucleation after previous excision.	
Silex.	*Ibid.*	49	M.	Black nodules on left eye in 1879; removed in 1881 and 1882. In 1886 large and small black tumors at lower corneal margin; removed in May and recurred in November. In 1888 large, black, nodular growth over cornea and adjacent sclera; also three smaller tumors.	Melano-sarcoma. Globe and cornea intact, except superficial epithelium.	Enucleation.	No metastases in orbit or body. Recovery.
Holmes.	Arch. of Ophthal., vol. vi., 1887.	40	F.	Small spot at sclero-corneal margin for many years, having appearance of a pterygium.	Small, round-cell melano-sarcoma; thin-walled blood-vessels.	Twice removed; then enucleated.	Cured.
Lagrange.	*Arch. d'ophtal.*, vol. iv., 1884.	42	F.	Pains in eye for two years. Tumor for fifteen days at sclero-corneal margin. Black mass size of a small egg. Frequent hemorrhages; no glandular enlargement.	No infiltration of interior of eye. Corneal epithelium only involved. Fusiform cells; old hemorrhages; pigment.	Enucleation.	Cured; no recurrences.
Badel.	Cited by Lagrange. *Ibid.*	75	F.	Black spot at limbus for fifteen years. Tumor black and of size of mushroom. No glandular enlargement.	Round and spindle cells; pigment. Sclera and cornea intact.	Enucleation.	Cured; no recurrence.
	Cited by La-	—	—	Bluish tumor at sclero-corneal	Adherent to superficial por-	Extirpation of tumor.	

———	Cited by Lagrange. *Ibid.*	—	—	Bluish tumor at sclero-corneal margin.	Adherent to superficial portions of cornea. No opacity. Round-cell sarcoma.	Extirpation of tumor.	
Hedden.	Cited by Lagrange. *Ibid.*	—	—	Tumor at sclero-corneal junction.		Extirpation of tumor.	No return at end of two years.
Adamück.	*Arch. f. Augenheilk.*, Bd. xi., 1881.	40	M.	Black spot of long duration at sclero-corneal margin.	Sclera not involved. Spindle cells.	Extirpation of tumor.	No recurrence at end of one year.
Remak.	*Arch. f. Augenheilk.*, Bd. xvi., 1885.	—	F.	Tumor at sclero-corneal margin for three years. At time of admission size of an apple, grayish-red color, arising by small pedicle from corneal margin. Sclera practically intact. No metastases.	Small round and spindle cell sarcoma. No intraocular involvement.	Extirpated three times, but always recurred. Finally enucleation.	
Lawford.	*Royal London Ophthalm. Rep.* 1889.	38	M.	Small spot for ten years. Reddish granular mass, size of small pea, at sclero-corneal margin.	Small, spindle-cell sarcoma; no pigment.	Partially removed; recurred rapidly and again removed.	
Roberts.	*Brit. Med. Jour.*, 1889.	—	—	Situated at limbus.	Melano-sarcoma.	Extirpation of tumor.	Recurrence after two years.
Pooley.	*Virg. Med. Monthly*, vol. xviii., 1891.	47	M.	Small black spot at limbus for three years. Coal-black, leech-like tumor. Another of smaller size at lower corneal margin.	Melano-sarcoma. No microscopical examination.	Extirpation of tumor.	No recurrence.
Rumschewitsch.	*Arch. f. Augenheilk.*, vol. xxiii., 1891.	61	M.	Blow on head causing bleeding from right eye. Yellowish-red, smooth, soft tumor at edge of cornea.	Spindle- and round-cell sarcoma.	Enucleation.	Vision lost after blow.
Blanquinque.	*Rec. d'ophtal.*, 1892.	60	F.	Small spot for twenty years. Tumor of size of pea on cornea (?) for nine years.	Melano-sarcoma.	Removal and galvano-cautery. Cauterized several times at short intervals.	
Schultze.	*Klin. Monatsbl. f. Augenheilk.*, vol. xxxii., 1894.	14	F.	Round spot one year. Flat brownish-red, smooth, tumors at sclero-corneal margins of both eyes. Not attached to cornea.	Large, round-cell melano-sarcoma.	Excised and scraped.	
Schultze.	*Ibid.*	61	F.	Growth for three years. Round, soft tumor at corneal margin.	Large, round-cell sarcoma; little pigment.	Excised and scraped.	Recurrence one year after; same treatment. Another one and a half years later. Exenteration of orbit. No glandular enlargement.
Donaldson.	*Trans. Ophthal., Soc., United Kingdom*, vol. xv., 1895.	21	F.	Round, grayish, gelatinous-looking tumor at sclero-corneal margin for nine months.	Alveolar sarcoma; round nucleated cells.	Excision of tumor.	No recurrence at end of one month.
Sgrosso.	*Annal. di Ottalmol.*, 1892.	—	—	Three cases.	Giant-cell-, small-cell-, and melano-sarcomata.		No involvement of interior of eye.

advancing even to the lids. The preauricular glands and the glands at the angle of the jaw are rarely if ever affected by the disease.

Pathology: Microscopical examination of these tumors shows them to consist of a fine network of connective tissue supplied usually with an abundance of blood-vessels, and containing large or small round and fusiform cells. In the nuclei of these cells we occasionally observe caryokinetic figures. In the majority of instances pigment is also found.

Extravasations of blood into the meshes of the growth are likewise of frequent occurrence. In those cases in which enucleation has been performed sections of the eyeball have invariably revealed that the neoplasm has not invaded the eye, but has remained confined to the epibulbar structures. Shiele, cited by Burckhardt, shows how the neoplasm proliferates from the conjunctiva, leaving the sclera and cornea intact, but forcing itself between the corneal epithelium and the substantia propria. It is this fact of the superficial situation of the growth which I would emphasize in this connection, since it justifies repeated attemps to secure a cure by excision before resorting finally to the more radical procedure of enucleation or exenteration.

Treatment: While recognizing the importance of thorough removal, where possible, of any organ affected by sarcoma, this does not apply to the eye, for we appreciate that these growths show no tendency to the formation of metastases at any time, or even to wide extension from their original site. In view of these considerations, it seems to me unjustifiable to resort at once to radical measures of enucleation or exenteration of the orbit. When these tumors are found to be confined to the region of the limbus, they should be removed with the knife or scissors, and the base should be thoroughly scraped with the sharp spoon, and as a precautionary measure cauterized with the galvano-cautery. Even recurrent growths may be treated in this manner, as long as they show no tendency to rapid extension. As many of these growths are quite vascular, difficulty will frequently be encountered in checking the profuse and occasionally alarming hemorrhage. This is best accomplished by the cautery,

supplemented by the application of a firm pressure bandage. Under use of strict antiseptic precautions the wound will usually heal promptly and leave behind a small, smooth scar, which does not interfere with the movements of the eyeball. The opinions here expressed are in complete accord with those of other observers, with, perhaps, the exception of Wilder, who is skeptical that anything short of enucleation will check the malignant process, although even he concedes that when the growth is small and has not invaded corneal and scleral tissue it may be removed with hope of success. Silex concludes that a cure can be effected if excision be done thoroughly and carefully, and he reserves enucleation for those cases in which the patient cannot be kept under observation, or in which vision is entirely destroyed. In this conclusion he is supported by Pooley, Blanquinque, Noyes, and others. He further states—and I concur in this opinion —that where conjunctival defects are left after operation it is seldom necessary to suture them, since even large defects cicatrize without interfering with the movements of the eye or producing ulceration of the sclera.

In conclusion I would offer the following summary:

1. Sarcoma of the limbus is of comparatively rare occurrence.

2. It never invades the interior of the eyeball, but remains confined to the external structures.

3. Metastases practically never occur.

4. Recurrences are frequent, but do not contra-indicate conservative measures in treatment.

5. Radical procedures, enucleation or exenteration, are unjustifiable except in those cases in which the growth has attained extensive proportions or in which vision has been destroyed.

A CASE OF BILATERAL KERATITIS PARENCHYMATOSA, BASED ON LUES HEREDITARIA TARDA, WITH MARKED TRANSITORY DIMINUTION IN TENSION AND VOLUME OF THE RIGHT EYE. (OPHTHALMOMALACIA SECUNDARIA.)[1]

By Dr. H. MUETZE, St. Louis, Mo.

IT is a well-known fact, that in different diseases of the cornea fluctuations occur in the tension of the affected eye. These disturbances in tension cause no anxiety to the oculist, as long as no diminution in the size of the eyeball manifests itself. If, however, a diminution of the globe becomes apparent in connection with furrows, and with alterations in the visual field, we are justified in diagnosticating phthisis bulbi and considering the eye irretrievably lost. Exceptionally such an eye may recover.

In 1879 Klein[2] reported two cases, in which phthisis bulbi was diagnosticated in connection with a keratitis and still complete restitution took place afterward.

The *first* case concerned a young man, nineteen years of age, in whom keratitis parenchymatosa developed first in the right, and later in the left eye, without any known cause whatsoever. The disease progressed rapidly, and owing to the grayish-white opacities and the enormous formation of new vessels, the cornea soon assumed a grayish-red appearance and shortly afterwards became entirely opaque. There existed moderate pain, marked episcleral injection, and considerable photophobia. In the sixth and seventh week the right, and then the left eye, began to get

[1] From the Eye-Clinic of the University of Marburg, Germany.
[2] Klein, *Lehrb. d. Augenheilk.*, Vienna, 1879, p. 233.

smaller. All therapeutic measures failed to arrest the process of diminution and a very unfavorable prognosis was given. About a year afterwards, however, the patient presented himself with *almost complete restoration of the visual power and normal dimensions of both eyes.*

The *second* case was that of a laborer, who was suffering with keratitis parenchymatosa in consequence of former syphilitic affections. In the seventh week the right ball began to diminish in size, and gradually complete atrophy of the ball supervened. About the same time the left eye became affected, although the process never reached the same degree as in the right eye. Inunctions of mercurial ointment were ordered; the inflammatory symptoms disappeared, and later the right eye, which was considered lost at first, began to regain its normal size. One year later, *the size and tension of both eyes were entirely normal.* As our case is none the less interesting, I have considered it proper to describe it in detail.

Elizabeth R., twenty-eight years old, was received as a patient at the Marburg Eye-Clinic, Feb. 22, 1893, at the solicitation of her attending physician, Dr. FREUDENSTEIN. According to the statement of Dr. Freudenstein her father, deceased, was for a long time an inmate of the Marburg Insane Asylum; her brother committed suicide in an attack of melancholia; her mother died with phthisis. Patient herself has a tendency to hypochondria and melancholy attacks. When a child, she suffered with scrofula, and learned to walk late. At the age of twelve years, the menses appeared, which always returned regularly and copiously until she got married. Patient is mother of four healthy children, the last having been born one and a half years ago. She has never aborted; the menses were regular and plentiful with exception of the last time, when they stopped after the second day.

In October, 1892, patient noticed a swelling of the cervical glands, and soon after both ears began to ring. By the use of an ointment the glands became smaller again. At the same time vision in the right eye gradually began to fail, and a little later also in the left. Besides the amblyopia and photophobia, patient had comparatively little trouble. December 11th, she consulted Dr. Freudenstein, who diagnosticated bilateral keratitis parenchymatosa with marked photophobia and posterior synechiæ. Atropine and sodium salicylate were now administered with only moderate success; in the course of time patient became so

melancholy, that Dr. Freudenstein, as mentioned above, concluded to place her in a hospital, thinking that a change of surroundings might have a beneficial influence on the condition of the patient.

Status præsens.—Very pale, medium-sized, moderately well-nourished woman. On the left side of neck a number of medium-sized indolent lymphomata. Below the angle of right jaw, a few very small glands can be detected. From both angles of the mouth little folds run downward and outward. The hard palate has the shape of a pitched roof. Upper central incisors are not convex on the cutting edge, but crescent-like concave; canine teeth are excavated in the same manner. Hutchinson's teeth. Patient is very hard of hearing. No abnormalities in respiratory and genito-urinary tract. No sensory or motor disturbances.

Eyes.—Pericorneal injection. Marked photophobia; no epiphora. Corneal epithelium smooth, but considerable interstitial opacity with moderate broom-straw-like formation of vessels.

Right Eye.—Entire cornea opaque. By lateral illumination a number of posterior synechiæ are recognized with some difficulty. Anterior chamber of medium depth. No ophthalmoscopic reflex.

Left Eye.—Inner surface of cornea fairly translucent. Pupil irregular. Grayish-red ophthalmoscopic reflex. R V = number of hands in 1 *m*. L V = fingers in 1 *m*. Ordered: inunctions of blue-ointment, potassium iodide, atropine, cocaine salve, and boracic acid applications.

During the first night of her presence in the hospital, patient complains of pain in left side of neck, walks up and down the room, sits on the beds of other patients, but is otherwise conscious, and goes to sleep after the administration of morphine sulphate 0.01 hypodermically.

March 8, 1893.—Patient is sent to Prof. Barth for examination of her ears. Result: nervous disturbance of hearing with still existing subacute symptoms of irritation. Whispered speech in 0.2 *m*. As causal agent, lues must be thought of in the first place.

The clearing up of the cornea takes place very slowly, especially in the right eye.

April 24th.—V R = fingers in 0.5 *m*. V L = fingers in 6 *m*. (The seven-year-old daughter of patient who comes to see her mother, May 16th, is suffering with incomplete ophthalmoplegia interna in her left eye; knee-jerk absent.)

May 20th.—No alteration in corneal opacities. *Right eye more sensitive to pressure; tension greatly diminished.* No improvement in hearing power. Otherwise patient feels well. Discharged by request, with potassium iodide and atropine salve.

When patient presented herself again, June 18th, *phthisis bulbi incipiens* is diagnosticated in *right eye.* Cornea uneven; $-T_2$. R V = number of hands in 0.5 *m.* Anterior chamber shallow. Apparent occlusio pupillæ. Left cornea a little clearer, but there are extensive posterior synechiæ; no ophthalmoscopic reflex. L V = fingers in 5 *m.* Patient re-entered hospital, June 25th; during her stay the condition of left eye remained about the same.

R: *The entire ball is a little diminished in size; the corneal diameter is distinctly smaller than in the left eye. Cornea not ulcerated, but uneven as in beginning shrinking of the ball.* Distinct deep vascularization. Anterior chamber very shallow; occlusio pupillæ; $-T_2$ to $-T_3$. Considerable pericorneal injection. No sensitiveness either spontaneous or on pressure. R V = number of hands in 0.3 *m.* Field of vision contracted, especially towards nose.

July 2d.—Right eye more congested, but not sensitive. *Flattening out of cornea increasing;* its surface smoother.

July 16th.—*Phthisis* has advanced more; patient is discharged by request, with potassium iodide and atropine.

July 20th.—Left cornea decidedly clearer. Grayish-red ophthalmoscopic reflex. No details. L V = $\frac{3}{36}$ + 4.00 D S. Sn 2.0 in 15 *cm.* R V = fingers in 10 *cm.* Field of vision free for movements of hand. *Contour of cornea seems better. Entire ball distinctly diminished in size.* Indication of furrows; $-T_2$.

Sept. 4th.—*Right ball is of approximately normal dimensions.* Cornea not smaller than in left eye, but a little more flat and uneven. Tension diminished, but essentially better than July 23d. Furrows not so distinct as before. Anterior chamber shallow; very dense, typically vascularized opacities in cornea. Eye not sensitive, but somewhat injected. R V = number of hands in 1 *m.* Numerous translucent spots in left cornea; below, well-marked opacity, possibly deposit. Almost complete posterior synechia with lentil-size pupil. Grayish-red ophthalmoscopic reflex, but no details. L V = $\frac{6}{60}$ + 4.00 D S. Sn. 1.6 in 15 *cm.*

By request, patient presents herself April 13, 1896, again. She gave birth to a healthy child two years ago. There are pretty

dense opacities in both corneæ. R, below, transparent, white opacities; atrophy of iris; pupillary membrane; strabismus divergens. Field of vision free. *Perfectly normal size and tension of ball.* R V = fingers in 1 *m*. L strong posterior synechiæ. Ophthalmoscopically, papillæ can be recognized; no details. L V = $\frac{6}{24}$. Sn 0.5 in 15 *cm*.

May 7th.—R *Iridectomy.* Transitory increase in tension during after-treatment. Discharged May 29th with clear coloboma. R V = fingers in 2–3 *m*.

The daughter Anna. Both eyes: myopia, objectively, 7.5 D. Incomplete ophthalmoplegia interna. Pupils moderately dilated, a little more in right than in left eye. Slight ptosis of right lid. Pupillary reaction weak to reflected light; a little more in convergence. Reaction better in left than right eye. Accommodation completely paralyzed. Function of horizontal muscles decidedly impeded, other muscles appear normal. R Strabismus divergens. Knee- and foot-sole reflex absent. No disturbance of motility. Striking hypalgesia of legs. Patient complains of sharp pains in legs at times. No ataxia; intellect good.

Diagnosis of Dr. Nebelthau.—Tabes incipiens.

In the foregoing history we find several points which undoubtedly permit us to assume that our patient was suffering with keratitis parenchymatosa due to hereditary syphilis. The fact that simultaneously with the corneal inflammation, ringing in the ears and hardness of hearing set in, which gradually increased until the hearing power of patient was considerably impaired, speaks strongly in favor of our diagnosis. The medium-sized indolent lymphomata on the left side of the neck and below the angle of the right lower jaw, as well as the linear cicatrices, relics of former rhagades, running from the angles of the mouth outward, form an additional proof.

The conspicuous deformity of the upper central incisors, which has been described by Hutchinson[1] as specially characteristic of inherited syphilis, combined with the pitched-roof shape of the hard palate, are symptoms which we only find in hereditary lues. The value of the above symptoms is to be rated so much higher, as in a recent discussion of a paper, read by Dr. C. Silex[2] before the Berlin Medical Society on "Pathognomonic Symptoms of Congenital Lues," in which, amongst others, Hirschberg partici-

[1] Hutchinson, *Diseases of the Eye and Ear.* London, 1863.

[2] Silex, C., "Pathognomonische Kennzeichen der congenitalen Lues." *Berl. klin. Wochenschr.*, 17 u. 24 Feb., 1896.

pated, it was decided that *the deformity of the upper central incisors* in connection with the scars at the angles of the mouth are to be regarded especially pathognomonic of hereditary lues. No sequelæ of acquired syphilis, such as scars, etc., can be detected on the patient's body ; besides she has never aborted, but has given birth to healthy children until two years ago. Soon after the administration of potassium iodide, atropine, and inunctions of mercurial ointment, not only the above-mentioned lymphomata disappeared, but the condition of the cornea improved essentially. This improvement continued under the anti-syphilitic treatment, and at present the disease has run its course, leaving behind some corneal opacities and posterior synechiæ. As patient frequently suffers with attacks of melancholia, and her brother committed suicide in such an attack, and as her father was treated for a long time at the Marburg Insane Asylum for brain disease, we can draw the conclusion that the syphilis acquired by the father was transmitted by heredity to the children.

It is generally accepted (*cf.* the text-books of Fuchs,[1] Schmidt-Rimpler,[2] Michel,[3] Panas,[4] Soelberg-Wells,[5]) that keratitis parenchymatosa, based on hereditary syphilis, is a disease of childhood or adolescence, occurring principally between the sixth and twentieth year, rarely before or after this age. If we consider the age of our patient, it is at once apparent that this is one of the rarer cases of keratitis parenchymatosa after doubtless lues hereditaria tarda, as they have also been observed by Hirschberg,[6] Pfister,[7] Parinaud,[8] and Hutchinson, Jun.[9] (I should like to call particular attention to the rare occurrence that the daughter of patient presented distinct symptoms of tabes incipiens with multiple paralyses of the ocular muscles at the early age of eight years. The syphilitic etiology of tabes and paralysis having been pointed out by Erb principally, it is certainly very remarkable to see these

[1] Fuchs, *Lehrbuch d. Augenheilk.*, 1895.
[2] Schmidt-Rimpler, *Augenheilkunde und Ophthalmologie.* Berlin, 1891.
[3] Michel, *Lehrbuch d. Augenheilk.* Wiesbaden, 1884.
[4] Panas, *Traité des Maladies des Yeux.* Paris, 1894.
[5] Soelberg-Wells, *A Treatise of the Diseases of the Eye.* London.
[6] Hirschberg, J. "Ueber specifische Hornhautentzündung," *Centralbl. f. prakt. Augenheilk.*, 1888, pp. 216 and 254.
[7] Pfister, Jul. "Hundert und dreissig Fälle von Keratitis interstitialis diffusa incl. fünf Fälle von Keratitis interstitialis annularis nach Vossius." *Klin. Monatsbl. f. Augenheilk.*, 1890, p. 114.
[8] Parinaud, H. "La kératite interstitielle et la syphilis héréditaire." *Arch. gén. de méd.*, ii., p. 521.
[9] Hutchinson, J. "A Series of Five Patients, Illustrating Interstitial Keratitis and Syphilitic Teeth." *Clin. Journ.*, Dec. 12, 1894.

symptoms appear at such a youthful age, as we are all well aware that the hereditary syphilis of the mother is neither inheritable nor transmissible. How far the following generations are affected through it with these diseases, cannot be decided at present.[1])

Our case is of especial interest, however, on account of the above-mentioned marked transitory diminution in tension and volume of the right eye. We see from our history that, May 16th, the tension of the right eye is considerably lowered.

June 18, phthisis bulbi incipiens is is diagnosticated, which progresses until, June 25th, a distinct diminution of the entire right eye has taken place. The cornea is uneven; $-T_2$ to $-T_3$.

July 16, the apparent phthisis has advanced still farther.

July 23, the cornea has a better contour, although an indication of furrows still exists; $-T_2$.

When patient presented herself, September 4th, again, however, the ball had almost returned to its normal size and tension. At present the *dimension and tension* of the right ball are *perfectly normal.* The question arises, how this process, which affected the right eye simultaneously with keratitis parenchymatosa is to be understood. We can hardly assume that we are dealing with a hypotony, as described by Nagel, *i. e.*, a simple softening of the ball, which occurs frequently in diseases of the cornea, especially in keratitis parenchymatosa. Although a tangible diminution in tension is observed in these cases, yet a condition, as described above, never prevails. At first progressive phthisis had to be diagnosticated, but this was not the case; for, after some time, the bulb not only returned to, but also preserved, its normal size and tension. If by the word phthisis therefore we designate the irreparable atrophy, I do not consider it commendable to call a case like ours phthisis bulbi, although Klein does so in his two cases (*cf.* article on phthisis bulbi, Eulenburg's *Realencyclopædia*). I prefer to call this process ophthalmomalacia on account of its favorable course and, as it occurred secondary to keratitis parenchymatosa, I should designate it "ophthalmomalacia secundaria." The conditions first described by Schmidt-Rimpler[2] as simple and intermittent ophthalmomalacia would have to be considered primary affections of a hitherto healthy eye. With this

[1] Galezowski has reported recently that the children of parents affected with hereditary syphilis are liable to suffer with keratitis parenchymatosa. *Recueil d'ophtalmologie*, 1896, p. 1.

[2] Schmidt-Rimpler. "Essentielle Phthisis Bulbi s. Ophthalmomalacie." Graefe-Saemish, *Handbuch d. ges. Augenheilk.*, Leipsic, 1875.

secondary ophthalmomalacia, all those cases would have to be classified in which, following some other disease of the eye, a marked transitory diminution in tension and volume takes place. We therefore include not only the above-mentioned cases of Klein (*l. c.*), but also those reported by Schweigger [1] and Landesberg.[2]

I beg leave to thank Prof. Uhthoff for kindly allowing me to publish the above case, and Dr. Axenfeld for his suggestions and valuable assistance in working it up.

[1] Schweigger, *Handbuch d. speciellen Augenheilk.*, Berlin, 1875, p. 532.
[2] Landesberg, *Archiv f. Ophthalm.*, xvii., 1, p. 303.
Refer. Schmidt-Rimpler, Graefe-Saemisch, v., pp. 151 and 153.

A CASE OF MYCOSIS OF THE INFERIOR CANALICULUS.

By Dr. JOHN DUNN, of Richmond, Va.

(With one figure in the text.)

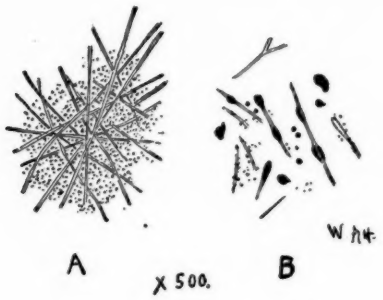
In November, 1896, a negro woman, aged twenty-four, came to the Richmond Eye Infirmary, complaining that her left eye annoyed her. Examination showed, protruding from the inferior canaliculus through the punctum, a whitish mass, in appearance resembling the mycotic aggregations not unfrequently seen on the tonsils, faucial and lingual. The diagnosis, mycosis of the inferior canaliculus, was made and the patient was told to return the following day for treatment. Nothing was seen of her for about two weeks. When she did return she was covered with a syphilitic eruption. She had also double iritis, together with a mucous patch of the conjunctiva of the left lower lid. At this visit there was no whitish mass to be seen projecting from the punctum. The iritis proved to be severe, and while the patient was under treatment nothing was noticed of an existing mycosis. Whether atropin had any effect in checking the growths I am unable to say. In the hurry of clinic work and in the presence of the great pain occasioned by the iritis no special examination was made of the inferior canaliculus. On February 2, 1897, the negress, whose visits to the clinic had been at irregular intervals, again appeared there complaining that something formed in the corner of her left eye and rubbed against the ball. A whitish mass was again protruding from the inferior punctum. (The use of the atropin had been for some days discontinued.) In the inferior cul-de-sac were several whitish strings of what was apparently mucus, but which under the microscope proved to be formed of roundish cellular bodies, probably spores, and a mycelium, fine and of varying lengths, resembling closely that of the leptothrix buccalis. The cellular bodies were, relative to the diameter of

the pieces of mycelium, very large. The quantity of this whitish stringy mucus accumulating in the inferior cul-de-sac was noteworthy; a fresh amount was present every minute or two; so much was this the case that I several times examined the conjunctiva to see if the fungus was growing from it. And I am inclined to think that, while the basis of fresh supply was always the inferior canaliculus, a further development of the fungus, pushed from the punctum took place in the inferior cul-de-sac, which was the seat of numerous enlarged follicles. The inferior canaliculus was slit along its entire length, when with a small spoon was removed about as much of the mycotic masses as would be represented by two of the smaller size of garden pea. The inferior punctum had been considerably enlarged by the fungus growing as it was pushed through it. The canaliculus, too, had been widened in all directions. No communication with the lachrymal sac could be found. There was no evidence of a similar affection of the upper canaliculus, through which a probe could be passed into the sac, which, however, was very small and had no communication with the nose.

Under the microscope the masses removed from the canaliculus were found to furnish the same characteristics as the stringy pieces found in the inferior cul-de-sac. In regard to the duration of this mycosis of the inferior canaliculus, nothing could be found out. The patient said that her left eye had "run tears" all her life. How the fungus found its way into the canaliculus is also an open question. There were no mycotic masses visible in either nose or throat. The canaliculus was washed out with a solution of nitrate of silver, twenty grains to the ounce, on two consecutive days, following which there was no recurrence of the mycosis. Patient was seen last on February 24th.

It is not unlikely that in this case the closure of the sac end of the canaliculus took place first, and that the spores of the actinomyces found their way in through the punctum. This is rendered probable by the fact that none of the fungus was found in the sac or in the superior canaliculus. That there existed no evidence anywhere along the mucous membrane of any ulceration, and the readiness with which a cure was effected after slitting the canaliculus, would point to mycosis of this particular region as one of the less important of the affections of the eye. Several of the mycotic masses were sent to Dr. Ward A. Holden, who kindly examined them and reported as follows:

"The specimen as received consisted of yellow shreds one or two millimetres in diameter floating in a liquid. These little shreds, when flattened under a cover glass, were found to consist of a number of interlacing rods imbedded in a mass of spores. The rods were fairly uniform in thickness and of various lengths, straight or slightly curved, and with no regular or characteristic arrangement. (Fig. A.) Leber's test for Leptothrix buccalis—a



violet reaction with iodine—was negative. Attempts to obtain stained cover-glass preparations were not particularly successful, and the clearest picture was obtained by dropping a weak anilin stain on the freshly crushed specimen, when the spores stained readily, and the rods scarcely at all. In such preparations many varieties of rods were found (Fig. B), some with large globular spores in the substance of the rod or at one end, others with club-shaped ends, some staining and some not, and an occasional rod forked dichotomously. The spores varied in size from a diameter less than that of a rod up to a diameter ten times as great.

"This micro-organism corresponds in the main with the descriptions of those found by others in concretions in the canaliculi, and formerly considered Leptothrix buccalis but denominated actinomyces by Schroeder (*Klin. Monatsbl. f. Augenheilk.*, 1894, No. 4), and since then by Elschnig, Ewetzky, and others; it having been found that actinomyces growing free does not exhibit the radial arrangement of rods with club-shaped ends which characterizes its development in the tissues."

Ewetzky, in his interesting article, "L'actinomycose des conduits lachrymaux" (*Arch. d'ophtal.*, April, 1896), from which the appended bibliography is copied, says that von Graefe con-

sidered these whitish concretions found in the inferior canaliculi as products of the fungus "Achorion Schönleini." Later Cohnheim and Leber referred their origin and composition to the Leptothrix buccalis. In 1874, F. Cohn found in these masses a special fungus, which he called "streptothrix Foesteri." In 1893, Tomassoli wrote a paper on actinomycosis of the inferior canaliculus. It remained for Th. Schröder, in 1894, to demonstrate that the "streptothrix Foesteri" and actinomyces were identical. Since the appearance of Schröder's paper, cases have been reported by Huth, Elschnig, and Ewetzky.

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20. Ewetzky, *Arch. d'opht.*, April, 1896.

METASTATIC CARCINOMA IN THE UVEAL TRACT OF BOTH EYES.

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Translated and Abridged by Dr. Denig, New York.

(*With Plates* I–III *of Vol. XXXIII. of Germ. Ed.*)

THE only case of primary carcinoma of the ciliary body, observed and anatomically described, was that of Badal and Lagrange[1]: The left eye of a boy of eight years, amblyopic since early youth, became blind three years before. The eye became larger, inflamed, and painful. The ciliary body of the enucleated eye showed two white tumors, the size of a pea, composed for the most part of typical carcinomatous tissue.

Cases of metastatic carcinoma of the ciliary body are also very rare. The only one was reported by Ewing[2]: A woman, suffering from primary carcinoma, located in the breast, showed metastatic carcinoma of the choroid, ciliary body, and iris of both eyes.

In addition to this the following tumor of metastatic carcinoma not only of the choroid, but also of the iris and ciliary body, seems worthy of publication.

June 12, 1894, a woman, forty-four years of age, came to the clinic stating that the sight of both her eyes began to fail three weeks previously. The ophthalmoscope revealed a flat detachment of the retina, occupying the temporal side of the retina of left eye and the region near the yellow spot of the right. R = + 5·5; V = $\frac{6}{36}$. L = fingers counted in 10 *cm.* Tension normal.

[1] "Carcinome primitif des procès et du corps ciliare." *Arch. d'ophtal.*, 1892, T. xii., 3.

[2] *v. Graefe's Archiv*, xxxvi., 1.

A primary carcinoma was discovered in the right breast; this had commenced about a year before and since then had increased continuously. Patient died three months later.

On *macroscopical* examination of the right eye a diffuse thickening of nearly the whole choroid is noticed. It begins around the optic disc and passes gradually into the normal choroid near the ora serrata (Fig. i., R), having the appearance of a flat tumor, the greatest thickness of which is 2. 5 *mm* on the temporal side of the ball. The retina is detached from the papilla to the ora serrata and the subretinal space is filled with coagulated masses. The lens, dislocated artificially through cadaveric maceration of the pigment and cylinder-epithelium of the ora serrata and the ciliary processes, lies on the detached retina (Fig. 1).

Microscopically the tumor is seen to have a typical carcinomatous structure: new formed connective tissue, forming alveoli, filled with epithelial cells (Fig. 2), some of which are round, others polygonal, 10.5—2.5 μ broad, the larger taking the stain better. Typical giant cells have not been found. At some points there are delicate connective-tissue fibres, enclosing fixed and pigmented cells and free pigment. At other points there are bundles of coarse connective tissue, especially near the sclerotic. The tumor contains also necrosed tissue (Fig. 4 a), degenerated cells not taking the stain, free pigment, many red blood corpuscles, and especially at its margin, small blood-vessels. At some points the capillaries of the choroid are surrounded with carcinomatous tissue, but they contain no emboli of carcinoma cells, whereas many emboli are found in the posterior ciliary arteries, near their passage through the sclera. Some of the capillaries contain carcinoma cells and shrunken red blood corpuscles, others carcinoma cells only (Fig. 3).

Only the inner layers of the sclerotic show a scant infiltration with epithelial cells; the outer layers are separated by a pigmented zone from the tumor. The detached retina shows no changes except some hemorrhages. The optic disc is somewhat infiltrated with carcinoma cells (Fig. 2 a) on its temporal side; the region of the ciliary body near the choroid is normal, while the origin of the iris in the ciliary body, on its lower and temporal side, is infiltrated with carcinoma cells; the latter pass through the filtration angle into the anterior chamber, invading the circular fibres of the ciliary muscle, but do not penetrate into the ciliary processes. The connective-tissue frame-work of this car-

cinomatous focus is very delicate. The adjacent parts of the iris and ciliary body show some round-cell infiltration. No carcinoma cells are found in the capillaries. Cornea and lens are normal.

The microscopical aspect of the left eye does not differ very much from that of the right. The carcinoma cells, causing a diffuse thickening of the choroid of the right eye, have produced distinct carcinomatous foci in the choroid of the left. No direct connection exists between the iridic and choroidal tumor. The ciliary muscle of the left eye is more extensively invaded by the tumor than that of the right eye; at a few points only the connective tissue of the ciliary processes is somewhat infiltrated (Fig. 5).

It is remarkable in this case, that the metastatic emboli—carcinoma cells—were found in the capillaries of the choroid of both eyes, and not found in the iris. The fact that carcinoma foci are seldom noticed in the iris, may be accounted for in some cases by an early enucleation, in others by the death of the patients before the tumor had had time to advance so far. In its clinical aspect the diagnosis is confirmed by the discovery of the primary carcinoma which in all cases but three has been located in the breast. Furthermore the diagnosis is not unimportant as regards the treatment of the primary as well as of the metastatic tumor. Neither enucleation of the eye, nor an operation for the primary tumor is of any use.

Explanation of Illustrations.

Fig. 1.—Section through the right eye R and the left eye L. T = temporal half, N = nasal half.

Fig. 2.—Section through entrance of optic nerve, showing at *a* the carcinoma cells situated between the nerve fibres. R eye. Zeiss obj. AA, ocul. 4.

Fig. 3.—Post. ciliary artery in sclera, the section is somewhat oblique. Carcinoma cells are situated in the lumen. R eye. Zeiss obj. DD, oc. 4.

Fig. 4.—A part of the carcinoma of the choroid, R eye. At *a*, area of necrosis; *b*, connective-tissue stroma increasing in thickness towards the sclera. Zeiss obj. AA. ocul. 4.

Fig. 5.—Section through the iris and ciliary body of the left eye. One of the few sections in which the meridional fibres of he ciliary muscles are not recognisable.

EXCENTRIC MEDULLATED NERVE-FIBRES.

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(*With Fig. 1, Plate VI. of Vol. XXXIII., German Edition.*)

MANY years ago Recklinghausen[1] examined microscopically the eye of a painter showing a peculiar condition. With the naked eye, a sharply defined rectangular white patch was noticed post-mortem, measuring 3 *mm* vertically and 2 *mm* horizontally. It was situated in the retina, 4 *mm* from the papilla, and presented a light asbestos-like color and plainly visible striation. The microscopical examination revealed that this area was composed of axis-cylinders surrounded by myelin sheaths. In short, it was a case of medullated (opaque) nerve-fibres.

The following case is similar, and, as far as I know, the first one to have been examined with the ophthalmoscope.

Lilly F., five years old, came under my observation on November 3, 1891. There was hypermetropia of 2.5 D in each eye. In the left eye a place of a peculiar aspect is situated at about 5 papilla-diameters from the disc.

In this place one of the principal veins divides into two branches which, from the point of bifurcation towards the periphery, are enveloped for a certain distance (see figure) by a white, shining substance. The latter exhibits the usual form of opaque nerve-fibres, and seems to have compressed the veins. I have observed this anomaly for four years, during which time it has not changed.

[1] Recklinghausen, *Arch. f. pathol. Anat. u. Physiol.*, 1864, p. 375.

CILIARY PROCESSES IN THE PUPILLARY SPACE.

By Dr. SIEGRIST, Bâle.

Translated by Dr. Arnold H. Knapp, New York.

(*With Fig. 3 of Plate VI., Vol. XXXIII., German Edition.*)

L. W., four and three-quarter years of age, on March 17, 1893, while at play was struck in the right eye by a dart. He came to the eye clinic presenting a vertical wound in the cornea and a traumatic cataract. The wound was immediately disinfected, and a part of the swollen lens-substance let out through the corneal wound.

On April 7, 1893, an iridectomy was performed in the upper-inner part, as the pupillary space was covered by the extensive corneal cicatrix. The pupillary margin of the iris was adherent to the latter, and consequently the entire iris was drawn towards the scar. Slight ciliary congestion persisted for some time.

The patient was discharged on April 20, 1893; the eye free from irritation. The area of the artificial pupil was partly filled with remnants of lens and capsule.

According to instructions the patient returned on July 14, 1894, for operation on the secondary cataract. The eye presented the following conditions which I have tried to illustrate by a drawing (see Fig. 3). The eye was free from irritation; the tension normal, possibly diminished. In the temporal half of the cornea there was a large vertical cicatrix to which the iris was drawn from all sides. The artificial coloboma of the iris was situated to the nasal side, and contained the following interesting structures:

At the apex of the triangle there was a yellowish, dense membrane with several pigment spots, evidently the shrunken and

thickened lens-capsule. Several reddish-brown, tapering processes occupied the base of the triangle. They extended half way to the apex, and then continued as delicate, transparent white lines to the remnants of the capsule above mentioned. In the lower part of the triangle a peripheral corneal opacity partly concealed the underlying structures.

Undoubtedly these were the ciliary processes which, together with the zonule of Zinn, had been drawn into the pupillary area by the shrinking capsule of the lens.

I have not been able to find the report of a similar condition. In Vienna, during the summer of 1894, Prof. Fuchs kindly showed me a similar though not so well marked a case. It is of practical importance in operating for secondary cataract under similar conditions to bear in mind the possibility of injuring the ciliary processes.

It was impossible to alter the position of the ciliary processes by the instillation of pilocarpine, eserine, or atropine.

In the case of our patient the secondary cataract was operated upon on July 19, 1894. De Wecker's scissors were employed, the cornea collapsed, and the eye remained soft for a long time. The incision was made in the line of the zonular fibres. Ciliary congestion remained for a long time. The patient was discharged on August 2, 1894.

The eye was again examined on August 30, 1895. The ciliary processes had retracted considerably to the periphery, owing to the release of the zonular tension. The region of the artificial pupil still contains numerous delicate opacities which will probably require another operation, as projection of light is good and the eye free from irritation.

I wish to express my thanks to Prof. Pflüger, who kindly gave me permission to publish this case.

A CASE OF UNILATERAL MICROPHTHALMUS WITH COLOBOMA OF THE OPTIC NERVE.

By L. WEISS and M. GOERLITZ.

Translated by Dr. A. N. Alling, New Haven, Conn.

(*With Fig. 2 on Plate VI. of Vol. XXXIII., German Edition.*)

IN view of the rare occurrence of one-sided congenital microphthalmus a detailed report of the following case seems of interest, especially as it presents other peculiarities still more infrequent.

Henry L., now eight years old, has been under observation for a number of years. There is no history of eye disease in the family—at least no mal-formations. His mother had no sickness before or during pregnancy. He has no brothers or sisters. Immediately after birth his mother observed nothing abnormal about the eyes. When eight days old he had an inflammation in the eyes which lasted four weeks but left no trace. When the boy was three months old the mother's attention was first called by relatives to the fact that the left eye was "smaller" than the right —the palpebral fissure could not be opened as widely. Although always a delicate child, he seems perfectly healthy. The left eye has always been somewhat sensitive to light.

Status præsens—Small, slightly-built child, fairly nourished, no trace of rickets. The left side in the region of the orbit decidedly flattened. The left eye is appreciably smaller, the palpebral fissure is shorter and narrower. In looking straight ahead the upper lid covers fully one quarter of the cornea. The left eyebrow is somewhat lower and shorter and less arched. The motility in both eyes is good, but the left at times inclines to diverge. The left orbital margin is decidedly smaller in all diameters.

In 1886, Arlt stated the interesting fact that non-developed eyes could increase in size from birth. When the observations

on the orbital measurements which were made in 1892 were compared with those made in 1896, it was seen that although the cornea was not changed, the growth of the microphthalmic eye was not only relatively, but absolutely, greater than in the normal eye.

The *right* eye is apparently normal in all respects. Refraction is emmetropic. The *left* eye shows a cornea evidently smaller than the right. The vertical diameter is approximately the same as the horizontal.

The Javal–Schiötz ophthalmometer gave the radius of the cornea decidedly smaller on the side of the microphthalmus. The pupil is round and nearly as large as the other; reacts to light, directly and consensually. Vision = fingers at 1.5 *m*—not improved. The field of vision is not contracted. With the ophthalmoscope the media are clear.

The left eye has excessive myopia—about 25. D. By the indirect method there is seen in the region of the papilla a large glistening white, rather sharply defined disc, appearing too large for a normal papilla. The arrangement of the blood-vessels is peculiar. They come forward in the upper part of the disc and close to the lower border, thus leaving the central part perfectly free. We have to deal then with a coloboma of the optic nerve.

In the upright image (*vd.* Fig. 2) the whitish disc appears nearly circular. On the temporal side it is provided with a conical process which is separated from the disc by a broad shining white strip forming the temporal border. In a similar way there runs, on the nasal side of the disc, a glistening white border which, like the temporal border, gradually loses itself below in a pit out of which spring a number of arteries and veins. One sees these rising sharply forward and bending rather abruptly downward over the apparently somewhat elevated edge of the disc. In the same way, in the upper part of the disc a number of vessels come perpendicularly forward, then bending sharply upward, supply the upper part of the retina. Within the central, apparently non-vascular part of the disc, there appears a round, shining spot irregularly outlined below, and just above this a number of very fine vessels can be seen by close inspection. They diverge above and lose themselves after a short course. If this bright spot can be taken for the optic disc, then these small vessels would be the rudimentary central vessels. The lower border and the greater part of the lateral borders of the disc are encircled by a pigment

ring. The whole lower portion lies more deeply sunken, especially behind the lower border where the vessels come forth.

If we compare the above with previously described cases, we are impressed with the great infrequency of unilateral congenital microphthalmus and also with the rare occurrence of a uniform development of the whole eyeball with the preservation of vision, even though moderate.

From such comparisons we must exclude those cases where the microphthalmus was an accompaniment of congenital orbital or lid cysts. The origin of these cases is indefinite on account of the great difficulty in explaining these cysts which seem to require a quite different interpretation. We must also exclude all those cases where we have to deal with a phthisical globe, and those very rare ones where there is a one-sided non-development from a pressure-atrophy resulting from a congenital or later-appearing tumor of the orbit or adnexa of the eye, if there is no evidence that the microphthalmus might have been produced before or independent of the presence of the tumor.

The preservation of vision in the microphthalmic eye has only rarely succeeded on account of the presence of other complications which in themselves interfere with the sight. Manz, in his monograph on malformations of the eyes, showed that such eyes seldom had relatively good vision, and the examples of microphthalmus with normal sight are doubtful in view of the insufficient methods of examination. "Abnormally large or small eyeballs are almost always the result of disturbances in the inner construction of the globe and not, as formerly supposed, the result of previous arrest of development." In fact, simple cases of microphthalmus are of the greatest rarity. In all literature there appear only four such, accurately observed and described—three by Martin (Inaug. Dissert., 1888), while the fourth appeared in the same year in *Arch. für Ophthal.*, by Carl Hess.

The cases of Martin occurred in three consecutive generations of one family.

The high myopia in our case is interesting, since in the few cases described high hyperopia was found. This refractive condition cannot be satisfactorily explained by the above-

mentioned sharp curve of the cornea alone, but it is probable that there must also be a high curve to the surfaces of the lens.

This case occurs in a well developed boy with perfect cerebral functions. The disturbance in development is wholly in the eye and the surrounding region. The microphthalmic eyeball outwardly, as well as by the ophthalmoscopic examination, particularly in the transparency of the media, is approximately normal with the exception of the coloboma of the optic nerve.

Although Deutschmann traced the origin of these malformations to an intra-uterine inflammatory process, especially sclero-chorio-retinitis, we could not accept this explanation on account of the absence of all evidences which would necessarily remain after such a process. We must rather adopt the older theory of Arlt, according to which the microphthalmus as well as the congenital coloboma stand in intimate relation to the disturbed closure of the retinal cleft —an opinion held also by Manz and lately by Hess.

The causes of such disturbances might be primarily conditioned by disturbances in the development of the brain, and with it the eye, and according to Kundrat, the failure in development which causes the microphthalmus is always primarily in the brain, "as later changes could no longer have a disturbing influence on the eye already formed." We must, however, in this case seek another cause, because disturbances in brain development are out of question on account of the nearly perfect form of the skull and the fully developed intelligence.

On the other hand, Arlt assigns the microphthalmus and the disturbed closure of the fœtal ocular cleft to causes lying in the orbit itself. Such a condition might be found in the deficient development of the bones of the left orbit, yet Manz has shown that, if such causal relation existed, we have to believe the deficient growth of the eyeball to be the occasion of that of the orbit and of the narrowing of the anterior diameter of the skull. Also the results of orbital measurements, on the one hand of one-sided phthisical globes, on the other of enlarged eyeballs, point to the fact

that the form and size of the orbit are conditioned on the size of the eyeball.

In this case, the presence of the coloboma offers ground for the theory of the disturbed closure of the fœtal ocular cleft as the cause for lack of development of the globe and of the orbit, but where the underlying cause for the incomplete closure of the retinal cleft is to be found, we are unable to say on account of the absence of any other malformations.

It is remarkable that among the few cases of unilateral microphthalmus not less than three times was there present in the eye only a coloboma of the optic nerve, which in itself does not belong among the most common malformations, and this too without further cleft formation. The most of the other cases showed coloboma of the iris, ciliary body, and choroid, so that Arlt could even say, that one finds "every time" a coloboma of the iris, and perhaps of the choroid, when the non-development is not of too high degree.

Finally, in most cases of unilateral congenital microphthalmus, the other eye presents no trace of cleft formation or other disturbance of development. In only a few have coloboma of the iris and choroid been observed with the eye of normal size. The cause for unilateral, congenital microphthalmus should be sought, in most cases, less in primary disturbances proceeding from the brain, than in an orbital disturbance which prevents the normal closure of the fœtal ocular cleft.

ABSTRACTS OF THE PAPERS IN VOL. XXIX. (1894) OF THE GERMAN EDITION OF THESE ARCHIVES NOT PREVIOUSLY TRANSLATED.[1]

By Dr. WARD A. HOLDEN.

I.—Skiascopic Examinations of School Children.

By Dr. C. HESS and Dr. C. DIEDERICKS, Leipsic.

At the suggestion of Professor Sattler we have recently examined the eyes of 1875 school children between the ages of six and fourteen years, with the skiascope devised by Hess, the eyes not being atropinized. The refraction was noted both in the vertical and horizontal meridians, and, when the astigmatism was oblique, in the principal meridians. The accuracy of the observations is indicated by the fact that when many of the children with gross errors of refraction were sent to the clinic to be re-examined for glasses the results of the two independent examinations corresponded almost exactly.

The number of emmetropes was found to vary in the various classes for girls from 20.6 % to 33.7 %, and for boys from 29.6 % to 45.5 %.[2] Astigmatism greater than 1 D varied from 8.5 % to 17.7 %. The degree of myopia increases gradually from 10 % in the VIIIth class (6th–7th year) to 32 % in

[1] Want of space in these Archives now renders it impossible to publish full translations of even the more valuable articles of the German edition, and it is proposed henceforth to give all the German articles systematically, in abstract at least, and the important ones in more or less abridged translation.—Editor.

[2] These percentages are rather low, but this is explained by the fact that we excluded every case of ametropia demonstrable with the skiascope, from the emmetropic category.

the 1st class (13th–14th year). The myopia of the boys is usually a few degrees higher than that of the girls in the same class.[1] Hyperopia decreases steadily from 60 % in children from 6 to 7 years to 38 % in those 13–14 years old. The degree of hyperopia is from 5–10 % lower in boys than in the girls of the same class.

The high percentage of hyperopia is also interesting, particularly as it cannot be considered a fictitious hyperopia caused by the use of atropine. The decrease of hyperopia with age is much less rapid than the increase of myopia.

In examining school children in Geneva Sulzer has found recently that in the beginning, myopia is frequently monocular, and when binocular is more excessive in the right eye. Our figures show 55.1 % of cases of anisometropia with the higher myopia in the right eye, and 44.9 % higher in the left, a difference not so striking as appears in the figures of others. In hyperopic anisometropia 51 % showed a less hyperopia in the right eye and 49 % a less hyperopia in the left. The reason for the lower refraction in the right eye is not clear.

II.—On the Changes in Corneal Astigmatism after Cataract Extraction.

By Dr. W. DELGANOFF, St. Petersburg, Russia.

The so-called traumatic astigmatism is one of the unpleasant but unavoidable complications affecting the result of almost every case of extraction of cataract. The history of the matter goes back to 1864, when Donders successfully corrected the astigmatism after extraction by means of cylindrical glasses. Following him, Haase, Woinoff, Reuss, Weiss, Becker, Laqueur, Scimeni, and Swan Burnett have all busied themselves with the subject, trying particularly to determine the effect of different methods of operation upon the resulting astigmatism, and each has advanced his own theories, but none has given sufficient attention to the changes which the cornea undergoes after

[1] This percentage of myopia seems very high, but we have included also cases under 1 D. It is interesting to compare our results with those of Böttcher and Schroeter, who examined the children of the same schools ten and twelve years ago. In one case our percentage of myopia is about equivalent to that previously found, while in the second case it is much less, possibly because of the better hygienic conditions now existing which keep down the increase of myopia.

extraction before it assumes its final permanent cylindrical form with the stronger refracting meridian perpendicular to the section.

Therefore at the suggestion of Professor Bellarminoff I made repeated examinations with the Javal ophthalmometer of 20 eyes operated on for cataract.

The literature of the subject is briefly as follows: After Donders had shown that the acuteness of vision was increased by using cylindrical lenses after extraction, v. Graefe confirmed the correctness of his observation, but was inclined to believe that in the cases of resulting regular astigmatism there had previously been a corneal astigmatism compensated for by a lenticular astigmatism in the opposite sense.

Haase then examined a number of patients with cylindrical lenses and found in all his cases that the curvature of the meridian at right angles to the section had become lessened. This flattening he explained as being due to the yielding of the fresh scar under the intraocular pressure. Prolapse of iris or abnormal healing from any cause produces a greater astigmatism.

Woinoff and Reuss then examined with the Helmholtz ophthalmometer 30 eyes operated on by Graefe's method. They concluded that the amount of astigmatism depends upon the retraction of the scar and the method of operating, the linear extraction leading to better results than the flap extraction. Weiss differed with the previous writers, stating that if new tissue is deposited between the lips of the wound as the others supposed, and the lips of the wound remained in the same plane, the curvature of the meridian at right angles must be increased instead of diminished. He favoured the explanation of Becker that the lower lip of the wound riding over the upper lip allows a shortening of the vertical diameter of the cornea and thus a lessened curvature. Weiss, however, did not attempt to explain the increase in refraction in the meridian parallel to the section, nor did Laqueur, who examined a number of eyes with the Javal ophthalmometer, and who agreed on the whole with Weiss's views.

Scimeni, who also used the Javal ophthalmometer, explained traumatic astigmatism as being due to a bulging of

the central portion of the wound and to the pressure of the lateral recti muscles on the eyeball, these two factors causing a flattening of the cornea in one meridian and an increase in its curvature in the other meridian.

Swan Burnett agreed with Scimeni and laid special weight on the fact that the resulting degree of astigmatism depends upon the healing process in the corneal wound.

In my own cases the cornea was measured before the operation, then from 1½ to 2 weeks after, again 3 to 4 weeks after, again 5 to 6 weeks after, and again until the results showed no further change and the final permanent astigmatism had been found.

The author's conclusions, his detailed tables being omitted, are as follows: At the first measurement after the operation the astigmatism varied from 2.–8.D, average 4.9 D. Second measurement, 0.5–7. D, average 3.6 D. Third measurement, 0.25–7. D, average 2.8 D. Last measurement, 0.5–5.5, average 2.6 D.

At the first measurement it was found that the refraction in the vertical meridian had diminished from 1.–6. D, average 2.6 D; and that the refraction in the horizontal meridian had increased from 0.25–6.5 D, average 3.2 D. At each subsequent examination there was an increasing approximation as regards both meridians to their curvature before the operation.

It was also found that with complicated wounds the astigmatism was always greater, and that in such cases the first astigmatism decreased in much less degree than in cases of normal healing.

In the author's opinion the chief causes of traumatic astigmatism are the intraocular pressure and the tonic contracture of the extrinsic ocular muscles.

III.—The Subjective Color-Perceptions caused by the Action of Certain Toxic Substances.

By Dr. RICHARD HILBERT, Lensburg, Germany.

Our knowledge of the fact that the internal use of certain substances causes colored vision is not exactly old. Szokalski, in 1842, first spoke of erythropsia after the use

of the seed of Hyoscyamus niger, and Patonillet found that persons who had eaten these seeds first saw all objects red, and later scarlet-red. Similar statements have been made from time to time regarding atropine and the cognate hyoscyamine. It has also been known that the use of santonin causes one to see all objects yellow. Detailed experiments with regard to the latter drug were first made by Mari in 1883. He found that santonin caused yellow-green vision, and he stated that the physical subtraction of yellow-green from his color perception would give the true color looked at. The spectrum to his eye appeared shortened.

The author undertook similar experiments with picric acid. Two minutes after the ingestion of 0.3 of picric acid slight yellow vision appeared and lasted two hours. This was not followed by blue or violet vision. With so small a dose one cannot suppose a yellow staining of the refractive media to take place, and the altered vision must be due to central processes. White objects and human faces appeared clearly yellow. The letters on a printed page were surrounded by a yellowish zone, and the paper, of course, appeared yellow. In looking at colors it was found that all shades of green and even blue-green took on a yellow-green hue, but that other colors did not seem particularly changed excepting red, which appeared orange. The spectrum was not altered. In the fact that other colors than green were not much changed lies a difference between the effects of picric acid and of santonin.

Xanthopsia has also been noticed after the external use of chromic-acid solution, and in icterus. Violet vision has been seen once in Japan from the toxic action of an unidentified microbe.

I have recently observed two cases of chromatopsia following drug intoxications.

The first patient, a Polish Jewess, instilled five or six drops of a solution of duboisin. sulph. (0.05-10.00) for a punctate keratitis. The patient, who was anæmic and neurasthenic, soon became excited, and the pulse became bounding, and all objects appeared to her to be scarlet-red, even when the

eye into which the solution had been dropped was covered, hus indicating a central disturbance. The erythropsiat passed off in half an hour.

The second patient was my six-year-old daughter, who took probably 0.12 of santonin, an excessive dose for her age. Soon after, she declared that all objects appeared grass-green. Her general condition was unchanged, and acuteness of vision and refraction were normal. The color-sense of the child is good and well trained, so that her statements can be considered reliable. It is evident that santonin has a different effect on different individuals. In many, it causes yellow vision; in others, yellow-green vision; and in others still, green vision.

IV.—A Contribution to the History of the Operative Treatment of Myopia.

By Dr. FUKALA, Pilsen.

It having been stated in *Nagel's Jahresbericht* for 1892 that Vacher had removed the lens in high myopia before this had been done by Fukala, the latter devotes five pages to a polemic discussion in which he claims to have done the operation two years before Vacher and for different indications. He speaks then of the first suggestion of the operation in 1817 by Beer, and the operation of tenotomy for progressive myopia first done in 1814 by Guerin and others, and concludes with references to the few sporadic cases of extraction in myopia reported before he formally revived the operation.

V.—A Contribution to the Physiology and Pathology of Corneal Refraction.

Preliminary Communication, by Dr. ADOLF STEIGER, Munich.

In this paper the author briefly records the results of the measurement of the refraction in the two principal meridians of a great number of eyes, and presents the deductions which may be drawn from these statistics. 500 eyes were of children between 1 and 8 years of age, 3170 eyes were of school children below 16 years, and 600 eyes were of adults,

150 of the latter being in individuals between 60 and 88 years of age.

The physiological part is as follows:

A. *Corneal Astigmatism.*—The human cornea is, as a rule, astigmatic, and the majority of the eyes of school children have the refraction of the vertical meridian about 0.78 D greater than that of the horizontal, and $\frac{7}{8}$ of the total number have an astigmatism between 0.25 and 1.25 D. Later in life the number of cases of astigmatism slightly above the average 0.78 D decreases gradually, and cases of astigmatism of 0.25 or less become relatively more frequent. Cases of astigmatism against the rule gradually become more frequent toward the seventieth year, and beyond that again become less frequent.

In a surprisingly large number of cases the corneal curvature is exactly alike in the two eyes, and in many more cases the difference is very slight. This difference, however, increases with the age of the individuals, showing that the factors leading to a change in curvature in later life do not always affect the two eyes in equal measure. In general the amount of the astigmatism is somewhat greater in women than in men.

B. *Corneal Refraction.*—The average refraction of the cornea in boys is 42.89 D and in girls 43.15 D, and nearly 60 per cent. of the corneas of the total number of school children had a refraction between 42. and 44. D. The refraction becomes gradually less with age, but at all ages the refraction of the two corneas in the great majority of cases remains alike or but slightly different, indicating that anisometropia is mostly due to different axial lengths of the eyeballs.

The greater the difference in the corneal curvature in the two eyes the greater, as a rule, is the difference in astigmatism; and it was also found that, when there was a great difference of minimal curvature in the two eyes, there was also unilateral or bilateral astigmatism of high degree, and a greater tendency toward unsymmetrical axes in the two eyes.

C. *The Axis of the Astigmatism.*—In the eyes of young

people the corneal meridian of weakest curvature is in 95.7 per cent. of the cases the horizontal, in only 0.8 per cent. the vertical, and in 3.5 per cent. the oblique. The higher the astigmatism the more likely is the meridian of least curvature to be oblique.

With increasing age the meridian of weakest curvature becomes less frequently horizontal and more frequently vertical or oblique.

In 91 per cent. of individuals the meridians of weakest curvature are correspondingly horizontal or vertical in the two eyes. Next in frequency come cases of symmetrical obliquity. In only 1.5 per cent. was the meridian of weakest curvature horizontal in one eye and vertical in the other. All other positions, such for example as parallelism of oblique axes, are great rarities.

The pathological part is as follows :

A. *The Relation between Interpupillary Distance and Corneal Refraction.*—The average corneal refraction in 92 eyes of men between the ages of twenty and eighty-eight was 42.35 D, and in 137 women within the same age limits 42.95 D.

When now the men are arranged in five groups according to the interpupillary distance, and opposite each group is put its average corneal refraction, we discover a very noticeable progressive lessening of corneal refraction as the pupillary distance becomes greater, and similarly the same relations are found in the case of the women, and also in the case of school children.

B. *Astigmatism of High Degree.*—By including in our lists a number of clinic patients we obtained a total of 243 eyes with astigmatism above 2. D, in 161 individuals, the other 79 eyes having less than 2. D, of astigmatism. The average astigmatism in these 79 eyes was 1.29 D, which is much above the general average astigmatism, from which we may conclude that, when an individual has a tendency to astigmatism, both eyes are affected in most cases, though frequently in unequal degree. It is noticeable that one abnormality of the cornea is apt to be associated with other abnormalities. Thus in these 161 patients the astigmatism is the same in both eyes in only 18 %, while in general it is

equal in the two eyes in more than 50%, and in 37% the axes are oblique, while in general, obliquity of axis is found only in 5.8% of cases. Furthermore, of the cases in which the axis is oblique in one eye and vertical or horizontal in the other, the amount of astigmatism is the same in only 1.5%. In these cases with astigmatism above 2. D, in which the axes are oblique, it appears that the meridian of least curvature is nasal in 75% and temporal in but 25%.

C. *Heredity in the Curvature Relations of the Cornea.*

a. Heredity of corneal astigmatism. We have endeavored when possible to examine the relatives of such individuals as had an astigmatism greater than 2. D in one eye at least, and among the 61 eyes of relatives so examined an average astigmatism of 1.68 D was found, more than double the average general astigmatism, and high degrees of astigmatism were found in a very large percentage of cases, indicating without any doubt the heredity of astigmatism.

b. The heredity of corneal curvature. It also was found that there was a family tendency to flatness of the cornea and the reverse.

c. The heredity of the direction of the axis. A marked family tendency to obliquity of axis manifested itself, and in some families even the degree of obliquity was approximately the same in several members.

The author announces that this theme will be more extensively treated of in a monograph to be published by J. F. Bergmann, Wiesbaden.

VI.—On the Pathology of the Optic Nerve.

By Prof. E. ADAMÜCK, Kasan, Russia.

This paper contains several clinical histories of acute optic-nerve inflammations, together with the author's ideas of classification and nomenclature of these inflammations. His first division is into general and partial neuritis of the optic nerve. The category of general neuritis includes œdematous neuritis or choked disc, and simple neuritis or the neuritis descendans of von Graefe.

The category of partial neuritis includes peripheric neuri-

tis or perineuritis, central or axial neuritis, and focal or disseminate neuritis.

It is particularly in the author's classification of the latter category that he takes issue with other writers. In perineuritis there will be a concentric contraction of the visual field, with or without a central scotoma, according as the affection is near the ball or farther back in the orbit, the affection probably beginning always at the apex of the orbit. In axial neuritis there will be no contraction of the field, but a central scotoma, which need not necessarily be regularly oval, as Wilbrand states, but which can have various forms. In neuritis disseminata there will be early in the disease a number of small scotomata, some of which may later coalesce to form a central scotoma of irregular form. Examples of the latter form of neuritis are found in disseminate sclerosis, in which small foci of degeneration are found in the optic nerve, while the intervening tissues are unaffected.

VII.—The Localization of Iron Splinters in the Eye by Means of the Magnetic Needle.

By Dr. E. ASMUS, Breslau.

After Asmus had published an account of his sideroscope in *Graefe's Archiv*, in 1894, his attention was called to a magnetic instrument constructed for the same purpose by Léon Gérard, and demonstrated by Gallemaerts of Brussels at the Tenth International Medical Congress at Berlin in 1890. Asmus claims, however, that while the Gérard's instrument merely indicates the presence of a splinter, his instrument localizes it in one portion of the eye. He presents a table of forty cases in which the instrument was employed.

VIII.—On the Operative Treatment of Myopia of High Degree.

By Dr. M. HORI, Tokyo.

This paper goes over the history of cataract operation in high myopia and includes detailed statistics of 15 of the total 28 cases which at that date had been operated on

in Schweigger's clinic. Schweigger's indications for the operation are as follows: The far point of the eye must be at *7 cm* or less, corrected vision must be at least $\frac{6}{36}$, there must be no inflammatory intraocular complications, and the macular changes in the choroid must not be very extensive. The younger the patient the better. The tests for distant and near vision are very scrupulously carried out. It is better, as a rule, to operate on one eye only, and preferably the more myopic eye. After the operation the aphakic eye is used for distant vision, and the other is corrected for near vision. A free discision is done under antiseptic precautions, the patient is put to bed for at least two days, and atropine is used from the first day. If the eye remains free from irritation, the lens may be allowed to undergo complete absorption, which requires about six months. If the lens swells rapidly and there are symptoms of irritation or increased tension, a linear incision is made 2 or 3 *mm* above the lower margin of the cornea, and the hard parts of the lens are extruded by pressure. Soft cortical masses may be left to undergo absorption. Finally a needle operation may be required for the secondary cataract.

IX.—Bilateral Distorsion of the Outer Commissure of the Lids from Congenital Shortening of the Platysma.

By Dr. RUDOLF DENIG, Würzburg.

In a girl of seven, brought to the Würzburg clinic on account of a convergent squint, the region of the outer commissure on both sides stood out somewhat from the eyeball, so that a pocket was formed as large as a pea, but the lid could be promptly closed. The face on both sides presented a peculiar shrunken appearance, like that following a burn, the cheeks being sunken, and the angles of the mouth being drawn down and out. In the neck several ribbon-like tracts ran upward to the lower jaw, the ear and the mastoid, throwing the skin into folds which varied in number and arrangement with every movement of the head. This entire condition was apparently due to a congenital

shortening of the platysma, whose insertion and whose relations to the muscles of the face are exceedingly variable. The author could find no case exactly similar in the literature, though two cases of congenital shortening of the platysma have been reported, one of which was cured by cutting through the skin and muscle, and having the head frequently moved during the healing.

X.—Clinical and Experimental Investigations on Subconjunctival Injections and their Therapeutic Value.

By Dr. CARL MELLINGER, Basle.

The opinion of Waldeyer, Schwalbe, Gallenga, and others, that a direct communication exists between the subconjunctival lymph passages and the great lymph channels of the eye, caused Reymond to try subconjunctival injections of bichloride in cases of sympathetic ophthalmia, and he reported good results.

Secondi then recommended the use of subconjunctival injections of bichloride in cases of destructive corneal processes. He used bichloride solutions from 1 : 200 to 1 : 2000, together with sodium chloride, and injected a quantity varying from one third to the entire contents of a hypodermic syringe. He reported particularly good results in the treatment of hypopyon keratitis.

After the Italians thus took the matter up, the French soon became interested, as shown by a discussion in the Société française d'ophtalmologie in 1891. Motais thought that he had seen better effects, in the treatment of sympathetic ophthalmia, from the injection of bichloride into Tenon's capsule. Darier recommended the use of subconjunctival injections in various eye diseases, such as parenchymatous keratitis, specific iritis, choroiditis, retinitis, and neuritis; and Rogman and Lagrange recommended the injections in infection after extraction, in iritis and in specific irido-choroiditis. In 1892, Darier recommended injections for almost every grave disease of the eye. In his paper, Darier compared the effects of subconjunctival injections of

bichloride of iodine (Pflueger), salicylate of soda, iodide of potassium, distilled water, and glycerin, stating that these latter solutions have not produced the effects obtained by using mercury. He used a 1 : 1000 solution, injecting an amount corresponding to one division of the scale on a hypodermic syringe. In severe cases doses 5 or 10 times as large may be indicated, and the injections are made every day or every second day. In obstinate cases as many as 60 injections may be required. If no effect is obtained by 10 injections, Darier regards it useless to continue the treatment.

Van Moll confirmed, in the main, the statements of other observers, mentioning the fact that adhesion between the conjunctiva and sclera remain after the injections, but that they have no significance.

Sgrosso and Scalinci, who had been able to demonstrate the favorable effect of the injections on destructive corneal processes in animals, both histologically and bacteriologically, spoke also of the adhesions between conjunctiva and sclera.

Since 1892, we had used in the Basle clinic bichloride 1 : 2000 with $\frac{1}{10}$% of sodium chloride, injecting from $\frac{1}{2}$ to the entire contents of a hypodermic syringe. But we soon found that injections of this strength caused subconjunctival inflammation, leading to circumscribed necrosis, or to extensive firm adhesions between the conjunctiva and sclera, as had been mentioned by Van Moll, Sgrosso and Scalinci. These effects, which did not seem trivial, led us to study the results of these injections on animals.

The entire contents of a hypodermic syringe filled with bichloride solution 1 : 2000 and $\frac{1}{10}$ per cent. sodium chloride was injected under the bulbar conjunctiva of a rabbit, near the insertion of the superior rectus. The upper lid became swollen and there was increased secretion, the conjunctiva was injected, the upper third of the cornea was bluish-gray, and the iris hyperæmic. The opacity of the cornea increased and hemorrhages appeared in the iris. There was then sloughing of the conjunctiva about the place of injection, and the epithelium of the upper part of the cornea

was cast off. The margin of the upper lid then became wrinkled and, later, entropium developed while the opacity of the cornea remained. Microscopic examination soon after the injection revealed an extensive round-celled infiltration which underwent the connective-tissue change, obliterating the subconjunctival space.

When small quantities of a 1:4000 solution were repeatedly injected, the cicatricial shrinking of the conjunctival sac did not come on and the results were far less injurious. It was then found that the use of the weaker of those solutions in the human eye was followed by the same therapeutic results as the use of stronger solutions, while the irritation produced was much less. These results naturally cast some doubts on the specific action of the injected bichloride, since the quantity of mercury injected could have little antiseptic effect on a hypopyon keratitis for example. We therefore were led to try injections of four divisions of the syringe scale of 0.75 per cent. and 2 per cent. sterilized salt solution in cases of keratitis, iritis, and choroiditis, and the results were at least as good as those following the use of bichloride.

The 2 per cent. salt solution was found more efficacious than the 0.75 per cent., and this solution had the advantages over the bichloride of not causing pain, of not causing necrosis of the conjunctiva, and of not causing adhesions between the conjunctiva and sclera.

How then is the action of the subconjunctival injections to be explained? It is certainly not the result, as was formerly supposed, of its disinfecting power. But it must rather be regarded as altering the absorption processes in the anterior chamber and cornea. Probably the lymph current is accelerated and the infective matters are more easily carried off. If the fluid injected contains salt, which draws fluid from the tissues, its accelerating action on the lymph current must be greater.

The beneficial effect on destructive corneal processes of accelerating the lymph current is well known. A corneal ulcer usually improves at once when its base perforates, and the Saemisch operation for corneal ulcer is merely an exten-

sive puncture of the anterior chamber, allowing the cornea to relax, and facilitating its lymph circulation. It is thus evident that paracentesis of the cornea and subconjunctival injections both act in the same manner.

Subconjunctival injections of salt solution were used as long ago as 1866 by Rothmund with the intention of clearing up the corneal opacities by means of the irritation excited by the injections.

Our conclusions may be summed up as follows:

1. The beneficial action of subconjunctival injections is, in our opinion, due to their stimulating effect upon the lymph circulation of the eye.

2. Subconjunctival injections of bichloride 1 : 2000 set up an adhesive inflammation, causing an obliteration of the subconjunctival space, and if repeatedly used are often accompanied by severe pain.

3. Subconjunctival injections of salt solutions have the same favorable therapeutic results as bichloride injections, without their ill effects.

XI.—On Subconjunctival Injections.

By Dr. G. GUTTMANN, Berlin.

Guttman, in this paper presents quite detailed abstracts of the entire literature of the subject, treating the reports critically. He then records his own results in a number of cases. The paper concludes as follows: As to my own experience with the subconjunctival injections of bichloride, I must say that, while I have made but fifty injections altogether, in several of my ten cases marked improvement, though perhaps transient only, was evident, which, according to Darier and others, manifests itself in most cases after three or four injections. My results on the whole, however, were so little encouraging that I have given up this method of treatment entirely, and I have convinced myself that few of the case-histories reported by others really prove indubitably the favorable effect of bichloride injections. It is nevertheless desirable to experiment further with less irritating medicaments.

Unfortunately, it seems that this so hopefully adopted method of treatment is like so many others that have been advocated in too early reports, which have excited the greatest hopes, have caused much pain, have scarcely accomplished a single cure, and have not infrequently been harmful.

XII.—Sympathetic Inflammation from Sarcoma of the Choroid.

By Dr. NIEDEN, Bochum, Germany.

The rarity of sympathetic inflammation from sarcoma, when the ball has not been opened spontaneously or by operative interference to allow the entrance of infective material, certainly justifies the report of a new and convincing case.

Of the 29 cases already reported, 14 (Norris, Rémy, Sal violi, Noyes, etc.) must be excluded, since either there was only irritation and not true sympathetic inflammation, or the presence of sarcoma was doubtful (Pagenstecher, Hotz). Of 12 further cases in which there was beyond a doubt sympathetic iritis or choroiditis, the same complication was found in the eye with sarcoma, yet these could not be considered pure cases since the ball had been opened by operation (iridectomy; Knapp, Berlin, Lawrence, Schüppel), or the tumor had perforated of its own accord (Milles, Steffan, Brailey), thus destroying the proof that the sarcoma itself was the cause of the sympathetic inflammation.

Only three cases are above criticism, one observed by Milles, one by Lawford, and one by Deutschmann. In Lawford's case the capsule of the ball had been perforated by the tumor, but the point of perforation was the optic nerve, and there was no external communication.

The only absolutely certain cases are those observed by Deutschmann and myself. The history of the latter is as follows:

A woman of twenty-one, previously healthy, and of healthy family, had recently suffered from chlorosis with irregularity of menstruation.

In the middle of 1892 the patient noticed a gradual disturbance of vision, and the examining oculist discovered a detachment of the inner-lower quadrant of the retina which did not undulate. Hemorrhagic foci in the vitreous led to the diagnosis of detachment in the right eye from hemorrhage due to amenorrhœa.

I saw the patient on December 8, 1892, when the condition of the retina was the same. V = $\frac{6}{60}$. Field contracted corresponding to the detachment. T N. Pupillary reaction normal. The left eye had a myopia of 1. D, and a moderate staphyloma posticum, with normal field and normal corrected vision. Only the immobility of the retina suggested tumor, while all the other physical signs and the history indicated a detachment from hemorrhage or serous exudation. The condition of the eye remained the same until July, 1893, menstruation being restored by medicinal treatment. At this time the patient returned with the statement that the right eye had been inflamed and painful for several days following a cold. When examined, a severe plastic iritis was found, with posterior synechiæ, cloudiness of media and pupillary membrane. V = $\frac{5}{60}$. The left eye was normal. Under treatment the iritis was cured, and the eye returned to its previous condition.

In November, 1893, the patient returned with a severe iritis in both eyes, more marked in the right, with posterior synechiæ, discoloration of the iris, and cloudiness of the media. R V = fingers at 12 feet. L V = $\frac{6}{15}$. R quadrant scotoma. L normal field. R + T. L T N. The detachment of the retina was more extensive and more highly elevated and uneven. It had a dark reddish-brown color.

The iritis in the left eye must be regarded as sympathetic, since it had all the characteristics of such an inflammation, and there was no cause in the eye itself for the development of a primary iritis.

The right eye was enucleated, and under inunction treatment the iritis in the left eye was cured, and in the course of four months vision was again normal.

The eyeball preserved in Müller's fluid was sent to Professor Deutschmann for examination. His report was as follows: There is a non-pigmented, richly vascular, spindle-celled sarcoma of the choroid, which has detached and displaced the retina, and has caused it to become partially atrophic.

The uveal tract exhibits signs of moderate inflammation, and the disc and neighboring retina also give evidence of inflammatory changes. In both, a few isolated and grouped cocci were found, but no micro-organisms were found in the nerve. Nevertheless, I regard the affection as of migratory origin. But whence have the micro-organisms come? I believe that after or during the development of the tumor they were deposited at this point, as in a locus minoris resistentiæ, or at a point of attraction (chemotaxis).

I believe that there can be no doubt of the sympathetic nature of the inflammation in the left eye. It has been characteristic of all these cases that the presence of the sarcoma alone has not produced the inflammation, but that this has come on after an irido-cyclitis has appeared in the first eye.

XIII.—On Latent Disturbances of the Ocular Muscles in Tabes Dorsalis.

By Dr. GUILLERY, Cologne.

One of the spots in which the pathological processes underlying tabes early localize themselves is the floor of the third ventricle and the aquæduct of Sylvius, as is shown by the frequency of early symptoms on the part of the ocular muscles, although opportunities for anatomical verification are rare. For a long time the threatening nature of diplopia without evident cause has been recognized, and the diplopia is known to frequently usher in the picture of a serious nervous disease. Yet in looking over the literature this diplopia seems not to have attracted the attention it deserves. The general clinician is accustomed to test the function of the extrinsic muscles only when the patient's complaints point directly to them, and since most of these patients do not see an oculist in the beginning, the first development of these motor disturbances has not been sufficiently studied.

It is well known that the effort to maintain binocular fixation may overcome, to a certain degree, defects in the ocular muscles, and often the remains of manifest paralysis

may be made out by careful examination long after the patient has ceased to complain of diplopia. I do not refer, of course, to cases in which the patient has learned to suppress one image. It suggested itself to me to find whether the first beginnings of such affections could likewise be made out before diplopia comes on.

When we notice the frequency of the disturbances of the intrinsic ocular muscles as compared with those of the extrinsic muscles in tabes, it would seem that the anterior part of the oculo-motor nucleus is especially disposed to these affections. But every clinician looks for the Argyll-Robertson pupil, and fails to accurately test the function of the extrinsic muscles, which fact may account for the large predominance of intrinsic disturbance.

The Maddox rod seemed to me to be the best instrument for determining the heterophoria, and a number of tabic patients were examined as to sight, refraction, binocular far and near point, and finally as to the muscular balance with oblique lines of sight. It suffices to say that many patients having orthophoria in looking directly forward, were found to have exophoria or esophoria in lateral fixation, indicating slight paresis of the recti, that was sometimes not sufficiently developed to give rise to diplopia when a red glass was held before one eye.

THE INDOLENT, CREEPING, CORNEAL ULCER.

By G. HERBERT BURNHAM, M.D., Tor. F.R.C.S., Edin.; M.R.C.S., Eng.,

ASSOCIATE PROFESSOR OF OPHTHALMOLOGY AND OTOLOGY, TORONTO UNIVERSITY; OCULIST AND AURIST TO THE GENERAL HOSPITAL, AND MERCER EYE AND EAR INFIRMARY, TORONTO.

A man named David P., aged thirty-five years, came to me February, 1897, with severe ulceration of the right cornea. He was evidently insufficiently supplied with food. The ulcer was rather superficial, of a dirty white color except the narrow, creeping edge, which was of a yellowish hue. It occupied two-thirds of the corneal surface, beginning at the extreme inner edge for two thirds of its circumference. Its shifting edge was markedly crescentic in shape, and its deepest cavity almost covered the pupil.

This form of ulcer is, as is known, often associated with general asthenia, of which condition the cornea is frequently a very accurate thermometer. This variety of ulcer must derive immediate benefit from treatment, or the cornea will otherwise be greatly damaged or perish. In cases where improvement does not take place, yellowish points of infiltration occur, and then perforation and its attendant evils. The form of treatment I have always adopted in these dangerous and often intractable corneal ulcers is as follows: Locally, a lotion of carbolic acid, 1 to 20, applied by being dropped, about a dozen drops every two to four hours, day and night, upon the surface of the ulcer; solution of eserine, gr. ⅛ to gr. ¼, four to six times in the twenty-four hours; quinine, gr. 3, four times daily, and bathing with warm water. During the interval a pad is placed upon the eyelids to keep them quiet, and thus aid repair. This of many forms of treatment I consider the most reliable and direct.

Besides, there is this peculiarity about the nebulous condition following the healing process where the treatment has been by carbolic acid, that absorption is relatively more rapid and complete than under any other treatment, thus leaving a clearer cornea.

When this type of ulcer is not severe I use eserine alone. The patient now under my care shows a very severe type of the ulcer, and the quick response to the treatment is very gratifying and encouraging. I have not mentioned other forms of treatment so well known, but do simply say that I consider in this variety of obstinate, creeping, indolent ulcer of the cornea, the treatment of carbolic acid and eserine locally, and quinine internally, with, of course, plenty of ordinary wholesome food, gives the quickest and best results. In thus expressing myself, I am but upholding and emphasizing the opinion given in the *American Journal of Ophthalmology*, November, 1884, in my paper therein published, entitled "The Use of Carbolic Acid in Purulent Affections of the Conjunctiva and Cornea," and still earlier in the Royal London Ophthalmic Hospital reports, when I was resident-surgeon to that institution.

A CLINICAL AND HISTOLOGIC STUDY OF A CASE OF EPITHELIOMA OF THE CORNEO-SCLERAL JUNCTION.[1]

By CHARLES A. OLIVER, A.M., M.D.,

ONE OF THE ATTENDING SURGEONS TO THE WILLS EYE HOSPITAL; ONE OF THE OPHTHALMIC SURGEONS TO THE PHILADELPHIA HOSPITAL, ETC.

(*With 3 drawings on text-plate III.*)

On the 30th of October, 1895, J. S., a sixty-nine-year-old laborer was referred to my clinic at Wills Eye Hospital by Dr. James D. Madeira of Reading, Pa. The patient stated that one year previously, without any history of traumatism, a "small pimple" appeared at the lower outer corneal border of the right eye; the growth, which had been painlessly though slowly and steadily increasing in size, having been repeatedly cauterized by caustics for several months previous to his first visit.

As can be seen in Fig. No. 1, reproduced from a water-color sketch made at the time by Miss Margaretta Washington of this city, there was a fleshy and wart-like-looking mass about the size of a large pea, embracing an area equal to almost the lower outer quadrant of the cornea. The growth seemed to start from a broad base in the conjunctiva just beyond the corneo-scleral margin. It was highly vascular in places, and its surface, which was rough and irregular, seemed to be infiltrated with sago-like particles. Running along the base, upon the conjunctival level, there were numerous vascular twigs which connected with several engorged conjunctival vessels. The conjunctiva in this region appeared, upon careful focussing with strong illumination, to be permeated with offshoots and narrow prolongations from the growth itself.

[1] Read before the November, 1896, meeting of the Section on Ophthalmology of the College of Physicians of Philadelphia.

The cornea beyond the area occupied by the tumor was transparent, the pupil was round, and the iris was unaffected and mobile. Intraocular tension was apparently slightly increased. The eye-ground revealed no gross changes. Vision was reduced to three-fortieths of the normal.

The left eye, with the exception of hyperopia and presbyopia, was unaffected in any way.

The patient was admitted to the hospital and the tumor-mass was removed. The involved portions of the conjunctiva were excised, the entire denuded area being lightly though effectually cauterized by heat. The scarification and cauterization were carried as far around the limbus of the cornea as there seemed to be any blood supply to the tumor-area. A few drops of a weak solution of atropine were instilled and the field of operation was covered with several turns of a roller bandage.

Two days later the entire area of denudation seemed to be covered with a thick and whitish membrane, and the burned points were granulating. The pupil was evenly and almost fully dilated. The eyeball and lids were freely mobile, and there was no pain.

Microscopic examination of some of the removed portions of the growth showed that it was epitheliomatous in character.

The patient was allowed to return home with the request to report in about two months' time.

On the 31st of January, 1896, he came back to the hospital, when it was found that the growth had assumed a size which was somewhat greater than before, and the conditions were apparently more malignant than when he was first seen. He was admitted to the hospital, and with the assistance of my colleague, Dr. George C. Harlan, every vestige of the mass was shaved from the underlying cornea and sclera with a Beer's knife, the raw surface left being situated deeply in the corneal lamella. All of the related blood-vessel stems were excised and their tips cauterized as freely as possible. During this operative procedure, as well as during the first operation, there was almost constant oozing of blood as the successive layers of the growth were excised, this at times being so pronounced that it was impossible to get any view of the field of operation. The tumor-mass itself seemed to be composed of a densely packed and friable material very similar to that seen in papillomatous formations.

The eye was dressed in the same manner as was done at the first operation.

Two weeks later, when the exposed corneal membrane became covered with thin layers of almost transparent epithelium, corrected vision rose to one-sixth of normal ($\frac{6}{30}$).

In spite of these two radical procedures the mass again recurred until, in four months' time, it had become so great in size and so angry in appearance that in spite of the good vision it was determined to sacrifice the organ.

On the 27th of May, 1896, the eye was enucleated whilst under the local anæsthetic influence of hydrochlorate of cocaine, this being necessary on account of gross organic cardiac and renal disease. The patient was very weak and feeble. During the operation he did not express any discomfiture until the optic nerve was severed, when he experienced a slight deep-seated painful sensation without the appearance of any phosphenes. The operation was performed as quickly as possible, I being assisted by my house surgeon, Dr. D. E. Esterly. All of the doubtful portions of the bulbar conjunctiva left after the eyeball had been removed, were looked over with a strong magnifying lens and freely excised, leaving only those parts that were apparently uninvolved. The patient was profoundly shocked, requiring the free use of whiskey and aromatic spirits of ammonia after the operation. The cavity was thoroughly cleansed with bichloride solution and closed with gauze, cotton, and a roller bandage.

In several days' time a deep and well-formed socket was obtained. The patient was discharged from the hospital a few days later.

At the present writing, April 1, 1897, there are no signs of recurrence.

The specimen (see Figs. 2 and 3 the originals of which were made for me by my friend and assistant Dr. George E. Gillespie) was then carefully cut by my friend, Dr. Ada Howard Audenried, of this city. Study of them shows the characteristic polynuclear cell-formation with numerous uncovered epithelial nests which at places fuse and sink into the deeper corneal and scleral layers and the surrounding tumor structures. The external epithelial layers plainly dip into the surface-fissures of the tumor-mass. After a most extended and painstaking search, no appearance of any basement membrane can be found—thus proving the epitheliomatous character of the growth.

Remarks.—From a clinical standpoint the case is most in-

FIG. 1.

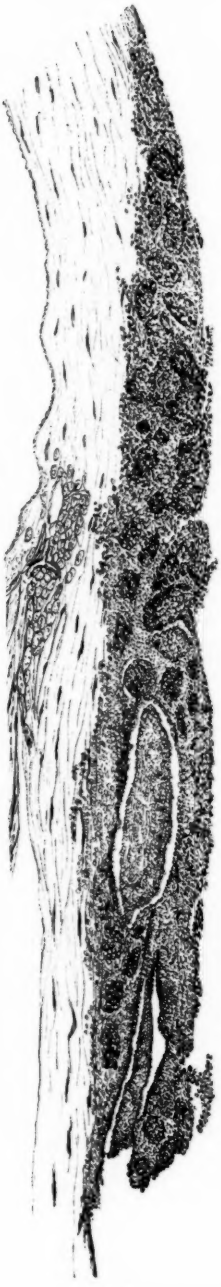


FIG. 2.

FIG. 3.

teresting. Commencing as a "pimple" in the epithelial structures of the conjunctiva at the transition-border between the cornea and sclera, as is almost universal in such cases, it gradually and painlessly increased in size until it assumed the papillomatous variety of epithelial growth. It then extended into and beneath the epithelium of the cornea far in towards the summit of the membrane. In other words, the tumor-mass evinced its development and growth in a manner that is eminently characteristic of epitheliomatous formations.

The quick recurrence and steady increase of the growth in defiance of the extreme radical measures employed for extirpation, plainly evidenced the necessity of removal of the entire field of malignancy. The almost uncontrollable oozing of blood experienced during the operative procedure plainly showed the extreme vascularity of the neoplasm.

Microscopically, the specimen is exceedingly instructive, not only by reason of presenting the characteristic appearance of epitheliomatous formation in the region involved, but upon account of the undoubted protrusion of the epithelial cells into the interlamellar corneal spaces (which possibly might have been produced or rendered more easy by the operative procedures pursued in the early stages of the disease), and the insertion of the same form of malignant cells into the superficial layers of the sclera (layers which were untouched by operation), but is also of interest in substantiating the view that the deepest penetrations of the epithelial cells into the outermost tunics of the eye are in the transition zone between the cornea and the sclera—that is, at the cornea-scleral junction.

Explanation of the Drawings on Text-plate III.

FIG. 1.—Macroscopic appearance of the tumor at the corneo-scleral junction.

FIG. 2.—Microscopic section showing position and extent of the growth.

FIG. 3.—Microscopic section showing infiltration of epithelial cells into the corneal lamellæ.

MAGNIFYING LENSES FOR USE WHEN OPERATING.

By EDWARD JACKSON, A.M., M.D.

PROFESSOR OF DISEASES OF THE EYE IN THE PHILADELPHIA POLYCLINIC SURGEON TO WILLS EYE HOSPITAL, PHILADELPHIA, PA.

(*With one drawing in the text.*)

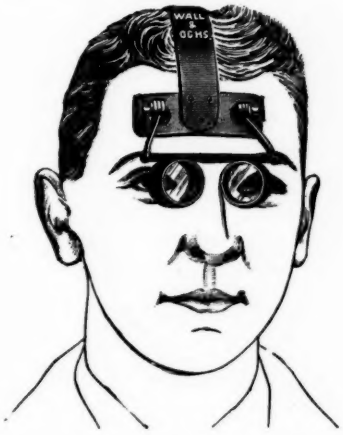
PROBABLY all ophthalmic surgeons have, at some time, thought of the use of strong convex lenses to assist in operating. To those who have reached that stage of maturity that brings presbyopia, something of the kind is a necessity; and for those who have not reached that maturity, a trial of the possible advantages to be gained by working with magnified images may have occupied time spent in waiting for practice.

The easy and natural attempt in this direction is made by putting a pair of strong convex lenses in a trial-frame. But working with such an arrangement, or with a pair of such lenses permanently mounted in spectacle or eye-glass frames, has proven unsatisfactory. It shuts off distinct vision beyond a certain distance, except by twisting the head to look over or under, or to one side of the glasses, and does not give sufficient magnifying power to be worth the difficulties and discomforts encountered, without bringing the surgeon's eyes too close to the eye he is operating upon.

Another method, free from most of these objections, but presenting certain others, has been to employ a strong magnifying lens, held close to the eye to be operated on. The difficulties with this are: it sacrifices binocular vision; and the holding of it must be entrusted to an assistant, or

to some special support which may not sustain it in the best position just at the critical moment; or to obviate this it has been attached to a broad ring on one of the fingers of the operator. But this last arrangement limits the movements and usefulness for other purposes of the hand, and entails an additional effort of co-ordination, at the time that the operator wishes to concentrate his whole attention upon the seat of operation.

The arrangement herewith presented is designed to give the advantages of considerable magnification of the seat of operation, without the disadvantages that have rendered other attempts in this direction unsatisfactory and of little practical value. The instrument here shown consists of the binocular lenses that I have elsewhere described (*Transactions of the American Ophthalmological Society*, 1896, page 742), modified to suit the particular requirements of this use, and supported by a head-band such as is used to support the mirror for illuminating the ear and throat.



In the first place, the lenses being supported by a rigid connection with the head are perfectly controlled by the surgeon through movements of the head, movements habitually co-ordinated with the use of the eyes and executed unconsciously without, in any way, distracting his attention.

Secondly, binocular vision is secured, and its value greatly increased by the combination of lenses employed, and with no greater effort of accommodation or convergence than is required in operating under the most favorable conditions without magnifying apparatus, and with no disturbance of the normal relation of accommodation to convergence.

Thirdly, the field of vision is not interfered with. The surgeon can look above or below, or to the right or the left of the instrument, without inconvenience.

Fourthly, the full advantage of magnification is obtained without at all sacrificing convenience by bringing the surgeon's eyes too close to the eye he is operating on. In illustration of this last point, suppose one wished to get the magnifying power of a 3-inch lens placed in spectacle frames close in front of his eyes. To do this he would have to bring his face to about three inches from the eye operated on. With the form of instrument I have used the operator's eyes are six inches from the eye operated on; and it is possible to get ten or twelve inches, or any greater distance, without sacrificing the magnifying power, by lengthening the bars carrying the lenses. However, I have found six inches quite a satisfactory distance, and probably no one will find more than eight or ten inches desirable.

The proportions and dimensions that seem best are as follows: Each tube 20 *mm* long, the lens at the lower end 13 D., the prism at the upper end 15 centrads (refracting power, or degrees refracting angle), the tubes making with each other an angle of 40 degrees, the upper ends with the centres 45 *mm.* apart.

Before venturing to present the subject, I have had the instrument in actual use for some months, and have found it of more practical value than theoretical considerations had led me to expect. It has been employed in extraction of foreign bodies, curetting corneal ulcers, iridectomies, discissions for soft and secondary cataracts, curetting the lens for traumatic cataract, and cataract extraction with and without iridectomy. It is for operations similar to these that it will probably prove most useful.

There is no difficulty in employing it when one has be-

come accustomed to it. It should be put on and completely adjusted to its proper position, in front of the eyes, before the final cleansing of the hands prior to the operation. In so far as it gives a magnified image, a good light on the seat of operation becomes of greater value.

The difficulties of learning to see through it are not very serious. Chiefly these are in the direction of mistaken judgments as to the extent of the incisions made, or of the parts removed. For instance, it is difficult to realize that you have not extracted the whole crystalline lens when perhaps only $\frac{1}{4}$ or $\frac{1}{3}$ of it has emerged from the corneal wound. Unless on his guard, the operator might make a smaller incision than he intended, without at once recognizing his error. Such difficulties may, however, be overcome without having to encounter them often in operations, by simply employing the lenses habitually to inspect the eye by oblique illumination.

In presenting this instrument I wish to express my indebtedness to Messrs. Wall & Ochs, of Philadelphia, who have made the instruments, for carefully carrying out my ideas, and for valuable suggestions as to the supporting band and the method of attaching the lenses to it.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE THIRD QUARTER OF THE YEAR 1896.

By Dr. ST. BERNHEIMER, in Vienna; Prof. C. HORSTMANN, in Berlin; and Dr. P. SILEX, in Berlin;

WITH THE ASSISTANCE OF

Dr. S. M. Burnett, Washington; Dr. Dantone, Rome; Dr. Herrnheiser, Prague; Prof. Hirschmann, Charkow; Dr. P. von Mittelstädt, Metz; Dr. Sulzer, Geneva; Dr. L. Werner, Dublin; Dr. C. H. A. Westhoff, Amsterdam; Dr. Schiötz and Dr. Ole Bull, Christiania; Dr. R. Greeff, Berlin; Dr. Deus, Berlin; Prof. Da Gama Pinto, Lisbon; and others.

Translated by Dr. Ward A. Holden.

Sections I.–V. Reviewed by Dr. ST. BERNHEIMER.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

TREATISES ON GENERAL, BIBLIOGRAPHICAL, AND HISTORICAL SUBJECTS. STATISTICAL REPORTS.

367. Iwanowsky. Reports from ophthalmic practice in the country. *Wjest. Ophth.*, 1896, No. 4–5.

368. Gunning. Annual report of the institution for eye patients in Amsterdam, 1895.

369. Snellen. Annual report of the ophthalmic hospital of the Netherlands in Utrecht, 1895.

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371. Czermak. Eye operations. Parts 8, 9 and 10, Carl Gerold's Sohn, Vienna, 1896.

372. GREEFF. Lecture-room charts of the eye. Edited by Professor Magnus. Part X. The structure of the human retina. J. N. Kern, Breslau.

373. OPHTHALMIC HOSPITAL OF CINCINNATI. Report for 1895.

374. RAY, J. M. Observations on the eye diseases and blindness in the colored race. *New York Med. Jour.*, July 18, 1896.

375. BRUNS, H. D. Two years in a southern eye-clinic; with especial reference to disease of the eye in the negro: 4160 cases arranged in statistical tables. *Amer. Jour. of Ophth.*, July, 1896.

IWANOWSKY (367) reports on 8 cases of anthrax of the lid, 3 of which were fatal; and on 70 cataract extractions with 2 failures, and on injuries of the optic nerve.

GUNNING (368) treated 10,541 out-patients and 344 in-patients, making 238 operations, 45 for cataract and 49 for strabismus. Iridectomy was done 51 times and enucleation 21. The trachoma cases comprised 4.08 per cent. of the whole number, these patients being for the most part Hebrews.

SNELLEN (369) treated 5497 out-patients and 640 in-patients. He performed 81 cataract operations, 16 linear extractions and 114 discissions, 95 iridectomies, 5 capsulotomies and iridotomies, 51 sclerotomies, 78 tenotomies, 43 enucleations, and also various minor operations.

WESTHOFF (370) treated 1436 eye-patients, 268 of whom had trachoma. He performed 13 cataract operations, 6 iridectomies, 2 enucleations, 25 tenotomies, and 12 lid operations.

WESTHOFF.

The new parts of CZERMAK'S (371) excellent descriptions of eye operations, treats, with his customary completeness and lucidity, of the operations on the ocular muscles and of some of the intra-ocular operations.

GREEFF'S (372) charts, which form the 10th part of Magnus's well-known series, offer an excellent representation of our earlier and of our present knowledge of the anatomy of the retina, which has been revolutionized by the investigations of Ramon y Cajal. The charts will be welcomed both by teachers and students.

During the year 1895, there were treated at the OPHTHALMIC HOSPITAL OF CINCINNATI (373) 2286 patients. There were

372 operations performed, including minor, of which 12 were simple extractions and 8 combined, 10 enucleations, 13 tenotomies, 2 advancements. BURNETT.

In the 1000 cases, 579 white, 421 colored, of eye diseases tabulated by RAY (374) there were 140 cases of lid trouble in the negro but not a single case of trichiasis or entropion ; hordeolum and chalazion frequent ; phlyctenular conjunctivitis very common. The two cases of trachoma in the negro were probably folliculosis in Ray's opinion. Sixty-three cases of trachoma were noted among the whites. Corneal diseases are 40 per cent. more common among the negroes. Six cases of gumma of the iris were noted. Severe iritis and cyclitis are much more common in the negro. Cataract nearly the same in both races. Atrophy of the nerve (primary) much more common in the negro. In a tabulated statement of 39 colored inmates in the State blind asylum the cause of blindness was phlyctenular keratitis in 13, purulent ophthalmia in 7, congenital cataract in 4, iridocyclitis in 5, atrophy of nerve in 4, retinitis pig. in 1, nystagmus in 1, traumatic and sympathetic in 3, small-pox in 1 ; none from trachoma.

BURNETT.

Of the cases tabulated by BRUNS (375) 27.04 % were negroes. This ratio seems to be maintained in diseases of the lachrymal apparatus, the conjunctiva, cornea, and sclera, lens, optic nerve, and retina. In glaucoma it is 37 %, and in diseases of the iris and ciliary body, 55+ %. Diseases of the choroid is only 16+ % ; chalazion, 53+ % ; catarrhal conjunctivitis, 32+ % ; phlyctenular conjunctivitis, 40 % ; pterygium, 8 % ; trachoma only 2 % ; no case in a pure negro ; corneal ulcers and leucomata, 55+ %.

BURNETT.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

376. DE WECKER. The prognosis of ocular tuberculosis. *Ann. d'ocul.*, CXV., p. 450.

377. HESS. Pathological studies of rare congenital malformation of the eye (orbital cyst, coloboma of the lens, zonular cataract and lenticonus). *Graefe's Archiv*, xlii., 3, p. 249.

378. MEYER. Two cases of microphthalmus. *Centralbl. f. prakt. Augenheilk.*, 1896, p. 237.

DE WECKER (376) again protests against the enucleation of tuberculous eyes, supporting his opinion by the report of two in-

teresting cases. A young boy suffered from complete tuberculous destruction of the cornea, with the formation of a large granulation nodule. In spite of the severe pain, enucleation could not be performed, since the patient was threatened with meningitis. The eye is now completely cicatrized, and but slightly reduced in size. In the second patient, a boy of five, iridectomy was done for a tuberculous iritis. The operation revealed the existence of tuberculosis in the adjoining part of the ciliary body. The consulting oculists unanimously advised enucleation, which, however, was not done. The patient, who is now twelve years old, has nearly normal vision in the eye whose enucleation was advised.

SULZER.

III.—INSTRUMENTS AND REMEDIES.

379. BERGER. On the employment of cocaine in ophthalmology. Ref. *Ann. d'ocul.*, cxvi., p. 135.

380. JUDA. The part played by the Dutch in the development of methods of cataract operation. *Nederlandsche Oogheelkundige Bydragen*, 2d edition, 1896, No. 1.

381. VEASEY, C. A. Concerning subconjunctival injections of sodium chloride *versus* mercuric chloride in various ocular diseases, with cases. *Amer. Journ. of Ophth.*, Sept., 1896.

382. OLIVER. The action of hydrobromate of scopalamine. *Amer. Journ. Med. Sciences*, Sept., 1896.

383. WILLETTS, J. E. The prismatic perimeter. *Annals of Ophth. and Otol.*, July, 1896.

JUDA (380) describes the methods and instruments used by Dutch surgeons after Daviel had described the extraction of cataract.

VEASEY (381) has tried the subconjunctional injection of a sodium-chloride solution in those cases where the mercuric bichloride has been commended, and finds it equally efficacious, and not painful. He thinks the good effects due to the unloading of the lymph channels. He has used the method with success in various forms of iritis, keratitis, and episcleritis. BURNETT.

After a series of very carefully conducted experiments OLIVER (382) finds that the scopalamine hydrobromate can bring about a complete paralysis of the ciliary muscle by a single instillation of $\frac{1}{480}$ of a gram, in twenty-three minutes. A return to the normal size of the pupil takes place rapidly (ninety-six hours). In this dose it is not dangerous. BURNETT.

WILLETTS (383) claims that the ordinary perimeter and all its modifications are false in principle, incorrect in practice, and thoroughly unscientific and unsatisfactory. He suggests in its place what he calls a prismatic perimeter, which consists of a cone or prismatic figure of six sides, which, held in front of the eye with its base near the cornea, will give a ring or six images of a single spot of light on the periphery of the retina at the same time. If one or more of these images are missing it shows a defect at that particular place. There may be several of these, the strongest being one of 73° 40′ angle, which throws the image to 75° from the point of fixation as it is computed in the ordinary perimeter. The spot of light may be made of any desired color, and the images on the retina being of the same color the color-fields are thus easily tested. He claims that with this instrument it is demonstrated that there is no restriction in the normal field for any color or object, and that the limitations usually ascribed to the temporal side of the retina do not exist. He suggests for practical use prisms of 70°, 60°, 50°, 40°, 30°, 20°, 10°, as being sufficient for all practical purposes. The prism or cone is fitted in a tube for its more convenient use. BURNETT.

IV.—ANATOMY.

384. BERNHEIMER. The decussation of the optic nerves in man. *Wiener klin. Wochenschr.*, 1896, No. 34.

In the second volume of his *Gewebelehre des Menschen*, Kölliker supports the idea of the total decussation of the optic nerves, and does not mention the embryonic and pathological proof of partial decussation brought forward in 1887–1889 by BERNHEIMER (384), who now refers to his previous papers and adds the description of a hitherto unpublished case of unilateral atrophy which supports his previous views. There seems to be no doubt but that in every section through the upper (dorsal) half of the human chiasm quantities of uncrossed fibres are to be seen ; these form no separate isolated bundle, but presumably comprise one-third or more of the total number of fibres in the nerve.

V.—PHYSIOLOGY.

385. HOEBEN. On an oculo-spinal centre. *Inaug. Dissert.*, Utrecht, 1896.

386. NESNAMOFF. On filtration and secretion of the aqueous

humor (from Prof. Leber's laboratory in Heidelberg). *Wjest. Opht.*, 1896, 4–5.

387. PAUSIER. A treatise on ocular electro-therapeutics, pp. 479. Maloine, Paris, 1896.

388. KÖTTGEN, ELISE and ABELSDORFF, GEORG. Absorption and decomposition of the visual purples in the vertebrates. *Zeitschr. f. Psychol. u. Physiol. d. Sinnesorganen*, xii., 3–4.

389. HESS, C. Studies in accommodation. I. Some new observations on the accommodative process. *Grafe's Arch.*, xlii., 1.

According to HOEBEN (385) enucleation of the eye is followed by the degeneration of a sympathetic centre in the spinal cord.

WESTHOFF.

NESNAMOFF'S (386) experiments on dead animal and human eyes, and on the eyes of living animals, led him to the following results: 1. Physiological salt solution filters through the chamber angle uniformly and in a definite quantity in a unit of time. 2. The filtration increases proportionately to the manometric pressure in the apparatus, *i. e.*, proportionately to the intra-ocular pressure. 3. The different rapidity of filtration in different animals depends upon the size of the anterior chamber, *i. e.*, upon the extent of filtration-surface. 4. Fluids which are not clear, and particularly such as hold insoluble matters in suspension, filter less readily and, finally, the pores of the tissues becoming stopped up, filtration ceases. 5. Pigment epithelium of the ciliary body or the posterior surface of the iris, heaped up in the anterior chamber, lessens considerably the rapidity of filtration. 6. The filtration in fresh human eyes proceeds as in fresh animal eyes, viz., regularly and proportionately to the pressure. 7. The rapidity of filtration in the living eye is equal to that in the dead eye when the pressure is the same in both. 8. The secretion of aqueous humor is proportional to the difference between the pressure in the secreting vessels and the intra-ocular pressure. 9. The secretion of aqueous humor takes place under a vascular pressure twice as great as the normal intra-ocular pressure.

HIRSCHMANN.

PAUSIER'S (387) text-book on ocular electro-therapeutics surprises one at first glance on account of its size—479 pages. And one's surprise increases in reading it to find that the matter is concisely treated, and that the book contains an extraordinary number of little known and very interesting facts. The historical part informs us that the first use of electricity dates from the

year 1749. The general part includes a description of the various apparatus. The electric physiology of the eye forms the introduction to the special part, which is valuable both on account of the collected literature and on account of the author's personal experience.

HESS (389) has made observations on eyes after iridectomy and after the use of eserine, that seem to support Helmholtz's theory of accommodation, which has been attacked by Tscherning. Hess found that after the instillation of eserine the ciliary processes press perceptibly forward and inward toward the margin of the lens. The distance between the ciliary processes and the lens-margin in elderly persons becomes less after the instillation of eserine. The zonula fibres, which are often visible as fine dark straight lines in the atropinized eye, can be seen, after eserine has been used, only indistinctly or not at all. The lens which, in the normal eye, is always immobile, may become temporarily tremulous after the use of eserine.

HESS believes that the results observed after the use of eserine may be applied directly to the ordinary process of accommodation, and he is the more fixed in this opinion since he has been able to show in his own eye and those of two colleagues that during an energetic accommodative effort the lenticular reflex images move tremulously, and in one patient a very evident trembling became manifest when very near objects were fixed.

Sections VI.–XI. Reviewed by PROF. HORSTMANN.

VI.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

390. WILLFÜHR. A contribution to the statistics of the inheritance of myopia. *Inaug. Dissert.*, Kiel, 1896.

391. PFLÜGER. On the operative correction of high myopia. *Ann. d'ocul.*, CXV., p. 445.

392. JANSEN. On the correction of high myopia by removal of the transparent lens. *Med. Aarskrift*, 1896, p. 87.

393. SCHIÖTZ. Operative treatment of myopia of high degree. *Norsk. Mag. f. Laeg.*, 1896, viii., p. 116.

394. VACHER. On the extraction of the transparent lens as a prophylactic measure against progressive myopia of high degree and detachment of the retina. *Ann. d'ocul.*, CXVI., p. 5.

395. LEERS. The operative treatment of high myopia. *Inaug. Dissert.*, Freiberg i. B., 1896.

396. STOCKER. The eyes of the pupils in the municipal schools of Lucerne. *Jahresber. über d. Primar- u. Secundar-Schulen der Stadt Luzern*, 1895–6.

397. PFLÜGER. Operative treatment of astigmatism. *Ann. d'ocul.*, CXV., p. 460.

398. MARLOW. A case of epilepsy and migraine apparently depending upon eye-strain. *Med. News*, July 4, 1896.

399. WILLIAMS, C. H. The discrepancy between the astigmatism as shown by Javal's ophthalmometer and the total astigmatism by trial lenses. *Annals of Oph. and Otol.*, July, 1896.

400. HENDERSON, F. L. A case of acquired regular corneal astigmatism. *Ibid.*

In the out-patient department of the Kiel University eye-clinic there were, according to WILLFÜHR (390), 376 of the total 1352 myopes in whom the inheritance of myopia could be demonstrated. Among these 7 were congenitally myopic; in 10 the grandparents were myopic; in 15, uncles, aunts, or cousins; in 71, brothers or sisters; and in the rest, the parents. Myopia above 5. D is here found more frequently than in eyes without an hereditary disposition. Staphyloma or other fundus changes were found in 128 cases. In the private practice of Prof. Völckers, heredity was demonstrable in 174 cases out of a total 257.

VACHER (394) has the credit of being the first in France to practise and recommend the removal of the transparent lens in high myopia. In an historical notice preceding the report of seven new cases he states that the extraction of the transparent lens in high myopia was first described and recommended by Desmonceaux in 1776 (*Traité des maladies des yeux et des oreilles*, Paris, 1776, p. 406). SULZER.

After describing 7 cases in which Manz had successfully removed the lens by discission and subsequent extraction in myopes under twenty-three, LEERS (395) states that when carefully done the operation is one of little danger, but one having no immediate influence upon the cure of the myopia or of intra-ocular diseases caused by myopia.

MARLOW's (398) case was an unmarried woman of thirty years who suffered from irregular menstruation. Has had sick headaches all her life, much severer since she was fourteen years old. She had also other attacks, epileptic in character, becoming rigid with some convulsive movements and loss of consciousness for hours. After a correction of her refraction by R + 1. ⌒ + 0.25

60°, L + 0.25 ⊃ + 0.75 100°, the attacks ceased. This was five years ago, and there has been no recurrence.

In 100 cases of astigmatism, WILLIAMS (399) found the axis and refraction alike by Javal's ophthalmometer and the trial glasses in 36 %; axes the same with differing refraction in 13 %; axes different with refraction alike in 18 %; axes and refraction both different in 7 %; no astigmatism by Javal, but some by glasses, 4 %; astigmatism by Javal but none by glasses, 13 %. It is not stated whether a mydriatic was used in all the cases.

BURNETT.

In HENDERSON'S (400) case, an officer in the navy, twenty-nine years old, during repeated examinations through a number of years, showed a vision in each eye of from $\frac{20}{30}$ to $\frac{20}{15}$. Ten years later he found accidentally that vision in the left was not good, and an examination revealed a myopic astigmatism of 1.75 D axis 15°, with V = 1 with correcting glass. The ophthalmometer revealed a corneal astigmatism of 2. D. The other eye is normal still. He has been engaged for some time in coast-survey field-work, using the sextant with his right eye, keeping the left closed with forced contraction of the orbicularis. It is supposed that this pressure was influential in bringing about the change in the cornea.

BURNETT.

VII.—EYELIDS.

401. ROST. On the occurrence of vaccine pustules on the lids. *Inaug. Dissert.*, Würzburg, 1896.

402. JUDA. Epithelioma palpebræ. *Nederlandsche Oogheelk. Bydr.*, April 2, 1896, p. 48.

403. WALTERS. On entropium- and trichiasis-operations. *Inaug. Dissert.*, Kiel, 1896.

404. IWANOFF. Operations for cicatricial entropium. *Wjest. Ophth.*, 1896, Nos. 4–5.

405. HOTZ. Outlines of plastic lid surgery. *Annals of Oph. and Otol.*, July, 1896.

406. KEYSER, P. D. Grafting in epithelioma. *Ophth. Record*, June, 1896.

ROST (401) observed a vaccine pustule near the left inner canthus of a woman of thirty-seven. Keratitis developed, but the recovery was complete except for the loss of the lashes in the affected area. The patient's child, which had been vaccinated, was carried on her left arm.

After the daily use of arsenite of potassium for six months, JUDA (402) saw an epithelioma disappear completely in a woman of seventy-one. WESTHOFF.

WALTERS (403) begins with a description of the usual operations for entropium and trichiasis, and then describes the procedure used in the Kiel clinic. After ectropionizing the lid, the cartilage is cut through in its entire length and a small roll of gauze is laid on the lid above the incision. A threaded needle is then passed through a small fold of skin at the free margin of the lid and again through the skin near the upper margin of the tarsus, the thread between the two folds of skin resting on the roll of gauze. Several sutures are introduced in this way, and are then drawn up until sufficient eversion of the lid-margin is obtained, when they are knotted.

IWANOFF (404) sees annually 2500 to 3000 patients, half of whom suffer from trachoma. Iwanoff's lid-operations exceed 800. He finds that the tendency to relapse is less in operations in which the tarsus is cut through, but as no method absolutely precludes relapse, every operation should be so done that further operations can be performed.

The author considers the Snellen-Hotz operation efficacious when the tarsus is not too greatly curved. When the latter is the case relapses are frequent, and the methods of Jaesche and Panas are preferable. The author has performed his modification of Panas's operation in more than four hundred cases, with few relapses. He begins with a canthotomy or at least a blepharotomy. The tarsus is then cut almost through from the conjunctival surface on a line $1\frac{1}{2}$–$2\frac{1}{2}$ *mm* from the lid margin. A flap of skin and muscle is then taken out higher up on the lid, and the sutures are passed first through the skin and muscle of the upper lip of the wound and through the upper portion of the tarsus, and are then passed down between muscle and tarsus, coming out among the lashes. For the lower lid Snellen's operation is regarded as the best, and for xerosis that of Rudin's.

HIRSCHMANN.

This lecture of HOTZ (405) is an elaboration, in its detailed application to cicatricial ectropion and entropion, of the following fundamental principles underlying all plastic operations on the lids: 1. A good operation must permanently remove the deformity and pressure, and restore, as far as possible, the movements of the lids. 2. The lines of incision in the lids must

follow, as far as possible, the direction of the muscular bundles. 3. No cicatrices must be left, and the result must not depend upon cicatricial contraction. 4. No scars should be left to rub on the eyeballs; nor, 5, should it produce any deformity which would make a second operation difficult or impossible. In the milder forms of entropion he simply attaches the stretched skin of the lid to the upper edge of the tarsus. In more extensive cases he grooves the tarsus, and in the severe forms he, in addition, incises the lid margin and introduces skin grafts, preferably from behind the ear. In all forms of cicatricial ectropion he first frees the lid skin from its attachment to the underlying tissues, and unites it to the tarsal border. Sometimes he fills the denuded space with Thiersch grafts, but by sliding flaps of skin if it is possible even if it be cicatricial. BURNETT.

KEYSER (406) reports the history of an epithelioma of the inner canthus extending through the skin to the bone, which was excised, and after scraping the bone the denuded space was covered with a skin graft from the arm. Fifteen months after the condition was very favorable, the contraction not being sufficient to materially interfere with the movements of the lids. The gold-beater's skin is not laid directly on the graft, but a small roll of cotton is applied around the edge of the graft to protect it.

BURNETT.

VIII.—LACHRYMAL APPARATUS.

407. LAFFAY. Accessory lachrymal glands. *Annal. d'ocul.*, cxvi., p. 137.

LAFFAY's (407) patient, a boy of twenty, who had been burned about the eye at the age of two years, presented the following condition:

The staphylomatous eye was surrounded by an extensive inflamed surface, the lids were ectropionized, and the continual secretion of tears kept up the irritation. After cutting out the upper-outer retrobulbar fold, the orbital lachrymal glands were removed through an incision along the arch of the brow. The secretion was in this way checked, and the inflammatory condition improved greatly. But in the inner-upper portion of the ectropionized upper lid numerous excretory canals could be seen, from which a clear fluid flowed continuously. These accessory glands have not been previously described. SULZER.

IX.—MUSCLES AND NERVES.

408. GLEUE. Contribution to the study of the dynamic relations of the ocular muscles. *Inaug. Dissert.*, Göttingen, 1896.

409. VALUDE. New method of muscular advancement. *Ann. d'ocul.*, cxvi., p. 112.

410. LANDOLT. Clinical observations on the surgical treatment of strabismus. *Arch. d'opht.*, xvi., 7, p. 401.

411. GUILLERY. On the amblyopia of squinting individuals. *Arch. f. Augenheilk.*, xxxiii., p. 43.

412. KUHN. On fixation with the paralyzed eye. *Beiträge z. Augenheilk.*, xxiv., p. 61.

413. FÜTTENER, GUSTAV. Paresis of ocular muscles preceding visible septic infection of tonsils, from which it originated. *Annals of Ophth. and Otol.*, July, 1896.

GLEUE (408) examined 160 individuals with reference to the dynamic relations of the ocular muscles. Among these, only 10 had ortohphoria for both distance and near, 149 had exophoria or esophoria, and 28 had hyperphoria.

VALUDE (409), in the operation of muscular advancement, divides the tendon in a longitudinal direction. The assistant seizes with forceps one angle of the tendon after it has been separated from its insertion, and the operator seizes the other free angle. The tendon is then split up a varying distance in the direction of the muscle fibres, depending upon the effect desired, and the sutures are so placed as to draw the two ends of the split tendon apart. SULZER.

LANDOLT (410) in continuing his reports describes a case of left strabismus divergens of 38° in which bilateral advancement of the internus and resection of a portion of the tendon brought about a restoration of binocular vision and normal lateral mobility and convergence. His development of the operation has been as follows: The earlier unilateral or bilateral tenotomies for strabismus convergens produced either an under- or an over-correction and also a marked diminution of convergence even when some strabismus remained. Landolt, therefore, soon gave up this operation, and only in excessive squint advanced the externus and tenotomized the internus of the deviating eye. Here also the adduction of the operated eye was very much diminished and the total effect was often slight or too excessive. The operation is not rational, since the abduction is diminished in both eyes in

cases of long-standing strabismus. Therefore, Landolt advanced both externi, making a careful tenotomy of the internus of the deviating eye. But even so, secondary strabismus may develop, and the range of convergence is unnecessarily restricted. He now, therefore, resects a portion of the tendon of each external rectus and advances the muscles. This procedure, which, with a few exceptions, such as paralytic or excessive divergent squint, corrects even high degrees of strabismus, is free from the disadvantages of the other operations, and particularly the lessening of the range of convergence. It is understood that stereoscopic exercises and other accessory methods of treatment are not neglected. v. MITTELSTÄDT.

According to GUILLERY'S (411) observations, the central and peripheric vision in squinting individuals may be affected in different measure. When the acuteness of peripheric vision is reduced, it is uniformly reduced everywhere, but in many cases peripheric vision is normal in spite of central amblyopia.

FÜTTENER'S (413) patient was a man of forty-two years, who had paresis of the external rectus, loss of color-perception, dilatation of retinal veins, and reduction of vision to $\frac{20}{60}$, accompanied by considerable fever which finally eventuated in an attack of tonsillitis. These symptoms slightly improved, to be aggravated by another attack of tonsillitis in which all the branches of the third pair were involved. With the subsidence of another attack somewhat similar, all the eye symptoms disappeared entirely. BURNETT.

X.—ORBIT AND NEIGHBORING CAVITIES.

414. ROLLETT. Double mucocele of the orbits. *Ann. d'ocul.*, cxvi., p. 136.

415. COPPEZ. Cystic osteoma of the frontal sinus. *Arch. d'opht.*, xvi., 9., p. 566.

416. MORAX. Ocular disturbances observed in a case of epithelioma of the frontal sinus. *Annales d'ocul.*, cxv., p. 409.

417. DU GOURLAY. A pocket of blood in the orbit without bruit or pulsation. *Ibid.*, p. 428.

418. BAKER. Three cases of skin-grafting in the orbit. *Annals of Oph. and Otol.*, July, 1896.

ROLLETT'S (414) eighteen-year old patient had a congenital malformation of the root of the nose, which formed a hard plate 5 *cm* broad. Eight months before, two symmetrical tumors ap-

peared at the sides of this exostosis. When punctured a mucoid fluid escaped, and the two tumors were thought to be in connection with the frontal sinus. When the sinus was opened the same thick mucoid fluid was found there. Empyema of the frontal sinus producing tumors in the upper-inner angle of the orbit, is frequent, but this mucocele of the sinus producing orbital tumors is much rarer, although both affections are to be considered grades of the same inflammatory process.

COPPEZ'S (415) patient, a laborer of nineteen, had a long, soft tumor as large as a cherry on the superior wall of the right orbit, displacing the eyeball and causing stasis in the retinal vessels. When operated upon, the tumor proved to be a cyst, which soon recurred, and at the second operation an osteoma of the frontal sinus was discovered, and it was found that the cyst consisted of mucous membrane from the sinus, which had prolapsed through the perforated wall of the orbit. v. MITTELSTÄDT.

MORAX (416) followed for three years the visual disturbances of a man of fifty-three, at whose autopsy an epithelioma was found in the sphenoidal sinus. For months the symptoms were limited to the eye. The history is as follows. Progressive decay of vision and sudden blindness without ophthalmoscopic change. Later, slight optic neuritis, ending in atrophy. Late in the disease the patient developed a purulent discharge from the nose, and pedunculated tumors appeared on the nasal mucosa, with muscular paralyses and exophthalmus. Death occured from broncho-pneumonia. Autopsy: primary epithelioma and dilatation of the sphenoidal sinus, entrance of the neoplasm into the body of the sphenoid, the optic nerves and the chiasm. Extensions of the growth passed into the orbit and antrum, and into the middle turbinated bodies. Secondary epithelioma of the frontal sinus. Broncho-pneumonia. In first looking at microscopic preparations of the neoplasm, one obtained the impression of its being a gland. There were vacuoles of various sizes lined with cylindrical epithelium in a single layer. The interior of the vacuoles was empty, or contained a granular mass, in which one could recognize desquamated epithelial cells, leucocytes and red blood corpuscles. The stroma of the growth, which was non-vascular, consisted of connective tissue of varying density. The sheaths of the optic nerves were difficult to recognize in the growth, and a fourth of the substance of the nerve had been involved. The centre of the nerve, which had remained free, was sclerosed.

SULZER.

Du Gourlay's (417) patient, a man of twenty-six, exhibited the objective and subjective symptoms of an affection of the left frontal sinus, with tumor formation in the neighboring portion of the orbit, but without signs of inflammation. The inner angle of the orbit had been injured five years before by a blow from the horn of a cow. After an exploratory aspiration, 30 *ccm* of normal venous blood were withdrawn by means of Dieulafoy's aspirator. A recurrence followed, and a radical operation was made. The mucosa of the sinus was velvety, but showed no break in continuity. Hemorrhage was slight, but lasted for a considerable time. Four months later the frontal sinus filled up with a polypoid mass, which required removal. Recovery. Sulzer.

These cases of skin-grafting on the eye by Baker (418) are as follows: 1. A sarcomatous growth at the sclero-corneal junction which was removed, taking with it a considerable amount of the corneal tissue and conjunctiva. The denuded spot was covered by a Thiersch skin-graft from the inner side of the arm. The case did nicely, the tissue smoothed down, though the original graft shrank a great deal. 2. A case of symblepharon in which the denuded space, after separation of the lid and ball, was covered with a Thiersch graft and healed well, with no return of the adhesion and good independent motion of the ball. In a man of sixty, it was necessary to remove the larger part of the upper lid and some of the lower on account of an angio-sarcoma of the upper tarsus, and with it some of the conjunctiva of the ball. The new lids were made by skin flaps with pedicles from the temples, and the conjunctiva was replaced by Thiersch grafts. In this case also good movement of the ball was obtained.

Burnett.

XI.—CONJUNCTIVA, CORNEA, SCLERA, ANTERIOR CHAMBER.

419. Belilowski. Sozoiodal preparations in the treatment of eye diseases. *Wjest. Ophth.*, 1896, Nos. 4, 5.

420. Hjort. Treatment of blennorrhœa neonatorum. *Norsk. Mag. f. Laeg.*, 1896, No. 8, p. 823.

421. Chibret. The geographical distribution of trachoma. *Ann. d'ocul.*, cxv., p. 452.

422. Herrnheiser. On trachoma and some affections of the conjunctiva beginning with follicle formation. *Die Praxie*, 1896, No. 19.

423. KALT. On the employment of copious irrigations in the treatment of granular ophthalmia. *Arch. d'opht.*, xv., 8, p. 484.

424. VILLARD. Researches on the pathological anatomy of granular conjunctivitis. *Ibid.*, xvi., Nos. 5 and 6, pp. 299 and 366.

425. BULL, OLE. Predisposing causes of trachoma. *Centralbl. f. prakt. Augenheilk.*, 1896, p. 321.

426. SCHANZ. On the etiology of pseudo-membranous conjunctivitis. *Arch. f. Augenheilk.*, xxxiii., p. 224.

427. PICHLER. On diphtheritic conjunctivitis. *Beiträge z. Augenheilk.*, xxiv., p. 1.

428. STEINER, L. A case of papilloma of the conjunctiva. *Arch. d'opht.*, xvi., 8, p. 50.

429. WAGENMANN. Carcinoma of the conjunctiva, arising from an exenteration scar. *Zehender's Klin. Monatsbl.*, xxxiv., p. 255.

430. TERSON. The therapeutic action of facial erysipelas on various ocular affections. *Ann. d'ocul.*, cxv., p. 358.

431. STOCKER, S. M. A case of urticaria of the conjunctiva. *Annals of Ophth. and Otol.*, July, 1896.

432. BURNETT, SWAN M. The social and geographic distribution of trachoma in the United States of America. *Amer. Journ. of Ophth.*, Sept., 1896.

BELILOWSKI (419) uses, in blennorrhœa, irrigations of 4 per cent. solution of hy-sozo-jodal or applications of a 1 per cent. vaselin salve. These preparations are also employed in the treatment of trachoma, corneal opacity and dacryo-cysto-blennorrhœa. HIRSCHMANN.

HJORT (420) in blennorrhœa neonatorum instils weak solutions of peroxide of hydrogen several times an hour, and also a $\frac{1}{10}$ % solution of nitrate of silver four times a day. SCHIÖTZ.

CHIBRET (421) has arranged a statistical report of the geographical distribution of trachoma, from reports furnished by various observers in different countries. Chibret's opinion that race plays an important rôle is supported by some of the facts brought out, and is refuted by others. It is, however, positively proven that there is no absolute race immunity. The various Indian nations of Canada were decimated by diseases brought over by Europeans, but they never suffer from trachoma. For the other races the disposition to trachoma seems to differ. If the

receptivity of the black race is put at 1.6, that of the white race would be 6.7, and of the Mongolian 11. Also, within the white race there are great differences. The Celts seem to be the most resistant, but their immunity is due not so much to race as to climate. The absolute elevation, however, is of slight influence. It acts, in producing immunity, in connection with the lower temperature, the moisture, and the absence of dust (Swiss plateau). The absence of trachoma in Ceylon can only be attributed to the influence of race, since trachoma flourishes under the same climatic conditions all along the coast of India. Its existence in the high villages of the Rocky Mountains is ascribed by the author to the insolation. In general the higher altitudes, and in certain conditions the sea climates, are unfavorable to the extension of trachoma. The insolation, the dryness of the air, and the heat may, however, neutralize the effect of the altitude. SULZER.

HERRNHEISER (422) speaks of the nature of follicular conjunctivitis and trachoma, considering them distinct diseases.

KALT (423) recommends his irrigations of the conjunctiva with an irrigator and a funnel introduced into the eye, previously used for blennorrhœa neonatorum, for trachomatous corneal affections also. In general affections of the conjunctiva with slight discharge, the procedure is of no value. Even when these irrigations are used the ordinary methods of treatment are not to be neglected. v. MITTELSTÄDT.

VILLARD'S (424) studies on granular conjunctivitis confirm our previous views of the structure of the granulation and increase our knowledge. The epithelium is always altered over the granulation. It becomes pavement-like; the intercellular spaces are broadened and filled with wandering cells. The granulations contain normal blood-vessels. Besides the connective-tissue framework there is a finer structureless intercellular network, apparently due to coagulation. The cells differ in size, form, and contents, but are all of mesodermic origin. The structure of the granulation is the same in its entire extent, and the central portion is not degenerated. The lymph vessels of the neighborhood pass directly into the granulation, which consists of a nodular group of uninuclear leucocytes. The granulation is transformed into connective tissue after the epithelium is lost and it ulcerates, or the transformation proceeds from the connective tissue underlying the granulation. v. MITTELSTÄDT.

OLE BULL (425) opposes the view of van Millingen that the

hygienic conditions of a country, the effect of civilization, are to be considered the best safeguards against trachoma, the altitude and the predisposition of the race playing no rôles.

SCHANZ (426) records four cases of pseudo-membranous conjunctivitis, all of which recovered within a few days, three being due to trauma and one to scrofula. In all these cases bacilli were found which were not to be distinguished from the Klebs-Loeffler diphtheria bacillus. The relation of this non-virulent bacillus to the virulent one is not yet clear.

PICHLER (427) reports the cases of diphtheritic conjunctivitis recently seen in the Innsbruck University eye clinic. All sixteen cases were examined bacteriologically, and they fall into three groups. In the first group (five cases) the Loeffler bacillus was found. In the second group (seven cases) the inflammation was similar, but only other microbes were found. In the third group (four cases) the Loeffler bacillus was found on the normal or but slightly altered conjunctiva. Fever and systemic disturbances developed only in the cases in which the Loeffler bacillus was found. This bacillus without doubt stands in a causal relation to diphtheritic and membranous or croupous conjunctivitis, but in some cases other microbes play the same rôle as the Loeffler bacillus.

STEINER (428) removed from the lower retrotarsal fold of a Chinese with eyes otherwise healthy, except for the presence of traces of granular conjunctivitis, a papilloma 5–6 *mm* in diameter. Each of the tufts was composed of thick masses of conical and cylindrical epithelial cells, arranged about the branched connective-tissue supporting framework. In the latter were many dilated vessels whose walls consisted only of a layer of endothelium, and which represented the dilatation of capillaries.

V. MITTELSTÄDT.

WAGENMANN (429) reports on the case of a man of seventy whose left eye had been exenterated two years before. From the conjunctival scar a carcinoma had developed, necessitating the enucleation of the stump.

TERSON (430) saw an extensive case of lepra of the conjunctiva improve under the influence of a facial erysipelas. The lids returned to their original shape, and the nodules of the conjunctiva vanished. Six months later the lepra re-appeared, but only in one eye.

SULZER.

STOCKER (431) describes a case of sudden burning and lachry-

mation of both eyes, which came on, without any cause referable to the eyes, at intervals, and disappearing in the course of a few hours. There was also redness, mostly uniform, of the skin of the cheeks and forehead. As the condition, on some occasions at least, followed the ingestion of strawberries, the author concludes it to be of the nature of urticaria. BURNETT.

This report of BURNETT (432) is that which was sent to Chibret as chairman of the committee appointed by the French Ophthalmological Society to collect statistics on trachoma. Letters of inquiry were sent to various oculists in all regions of the United States, asking their observation as to the frequency of trachoma among different races, the effect of altitude, employment, contagiousness, etc., a distinction being made between true trachoma and follicular conjunctivitis. Thirteen answers were received, which are printed in full. The conclusions which Burnett draws from the information thus furnished is that in the United States altitude seems to exercise but little influence on the frequency of the disease. The Jews, the Irish, and Italians are the greatest sufferers, though the American of the central region of southeastern Kentucky, West Virginia, and North Carolina forms an important element in the statistics both as to frequency and virulency. The negro is reported as being practically immune even in communities where the disease is very prevalent among the whites. Opinions are divided as to contagiousness.

433. SAUVINEAU. Recurrent keratitis from infectious dacryoadenitis. *Annal. d'ocul.*, cxv., p. 457.

434. STRAUB. Keratitis phlyctenulosa. *Nederlandsch Oogheelkundige Bydragen*, 2d Aufl., 1896, p. 47.

435. CSAPODI. A case of parenchymatous keratitis. *Ungarische med. Presse*, 1896, No. 5.

436. SCHÜTTE, S. A contribution to our knowledge of keratitis parenchymatosa. *Inaug. Dissert.*, Kiel, 1896.

437. FRANK. Contributions to the diseases of the cornea: chronic peripheric excavating keratitis, ulcus rodens, pneumococcus ophthalmia, and atypical spring catarrh. *Inaug. Dissert.*, Marburg, 1896.

438. SCHIRMER. On opacities of the cornea from folding. *Graefe's Archiv*, xlii., 3, p. 1.

439. HESS. Investigations on the development of striped opacities of the cornea. *Arch. f. Augenheilk.*, xxxiii., p. 204.

440. De Schweinitz. Concerning the repair of corneo-scleral wounds with prolapse of iris. *Ophth. Record*, June, 1896.

441. Moulton, H. Keratitis interstitialis annularis. *Annals of Ophth. and Otol.*, July, 1896.

442. Allport, Frank. Keratitis dendritica. *Amer. Journ. of Ophth.*, July, 1896.

In the case of a girl of seven, who had suffered since her third year with recurrent severe purulent inflammation of the left eye, Sauvineau (433) noticed that the accessory tear gland of the same eye was enlarged and lobulated, and that the conjunctiva covering it was bluish-red. Cultivations of the secretion of the gland showed staphylococci in pure culture. Injections of 1:1000 bichloride solution into the gland soon cured the keratitis, and was again successful in a relapse of the keratitis three months later. Since then the eye has been free from inflammation, and the accessory gland is atrophic. Sulzer.

Straub (434) discusses the predisposition of the limbus cornæ to become the seat of ulceration in phlyctenular keratitis and in many conjunctival inflammations. He seeks the cause of this predisposition in the form of the eye, there being a ring-shaped retraction at the limbus. In winking, when the anterior surface of the eye is cleansed, impurities may readily remain in this furrow, and give rise to inflammations. Westhoff.

Among 84 cases of parenchymatous keratitis Schütte (436) states that 27 patients were between one and ten years old, 40 between ten and twenty, 12 between twenty and thirty, and 5 above thirty. Iritis complicated the keratitis 20 times, æquatorial choroiditis 8 times, and choroiditis disseminata 5 times. The author believes that, excepting the tuberculous cases, all are due to syphilis, and that Hutchinson's doctrine is the only correct one.

Frank (437) reports on three cases of chronic peripheric excavated ulcer of the cornea, his account corresponding with Fuchs's description of keratitis marginalis superficialis. These develop near the corneal margin, one or more crescentic excavations arising from a marginal infiltration. The course is slow, but the permanent changes are slight. He also reports on two cases of rodent ulcer, the progress of one being checked by the use of the galvano-cautery. He further describes a case of large, flat, smooth, non-infiltrated corneal ulcer in a cachectic old man. This soon became purulent, and led to panophthalmitis. Bacteriological examination showed that the affection was probably caused by the pneumococcus.

SCHIRMER (438) believes with Hess that the striped keratitis after extraction, and the striped keratitis with hypopyon keratitis, are due to folding of Descemet's membrane.

On the ground of the microscopic examination of an eye which was removed after an injury, a striped keratitis having developed, HESS (439) concluded that the stripes were due to folding of the deeper layers of the cornea, the opening of the anterior chamber causing a difference in tension in the vertical and horizontal diameters, as if the cornea was compressed from the side.

DE SCHWEINITZ (440) gives his experience in the treatment of prolapse of the iris at the corneal margin, through wounds or through perforating ulcers. He has tried da Gama Pinto's method of covering the open space, after the prolapsed iris has been excised and freed from the edge of the ulcer, with a piece of conjunctiva. Once he took the conjunctival graft from the other eye. This method is to be preferred in small round ulcers. For the larger wounds or ulcers he abscises the prolapsed iris, and, after freeing the wound of iris, brings its edges together with from one to three fine sutures. Cases illustrative of both methods are given.

BURNETT.

MOULTON (441) reports a case of this uncommon form of keratitis interstitialis in a man of sixty-seven years. The ring was densely opaque, 1 to 2 *mm* wide, entirely surrounding the central two-thirds of the cornea. The remaining part of the cornea was clear. There was no specific taint recognized. Rheumatism, hay fever, or malaria was the probable cause. BURNETT.

ALLPORT (442) gives the history of a man thirty years of age who had a mild attack of gonorrhœal conjunctivitis, which was followed by a corneal ulceration of a distinctly dendritic type, the development of which was carefully watched. All the remedies that have been recommended were tried, and all were equally unavailing. General tonics, with atropine, hot applications, and scrubbing with alcohol and a saturated solution of boric acid seemed to assist more than anything else. BURNETT.

Sections XII.–XXI. Reviewed by DR. SILEX.

XII.—IRIS.

443. VYSIN. Two cases of perverse pupillary reaction. *Casopis ceskych lé Kam*, Nos. 44–45, 1896.

444. TERSON. Gummata of the ciliary body. *Annal. d'ocul.*, CXV., p. 456.

445. TERSON. Early gummata of the ciliary body. *Arch. d'opht.*, xvi., 7, p. 455.

446. HIRSCHBERG. On discolorization of the iris. *Centralbl. f. prakt. Augenheilk.*, xx., p. 257.

VYSIN (443) reports two cases in which the pupils dilated in accommodation and contracted in distant vision. One patient was a railroad conductor who suffered, after an accident, with symptoms of traumatic neurosis. The other patient exhibited this perverse pupillary reaction only during attacks of migraine, to which he was subject. The latter case was considered as proving that migraine is caused by cortical disturbances and that the pupillary reaction is also under the control of the cerebral cortex, and that when the function of the cortex is disturbed the pupillary reaction may be affected. HERRNHEISER.

TERSON (444) describes three cases of the formation of gummata in the ciliary body two or three years after infection, with a tendency to caseous degeneration and perforation of the ball. Gummata of the skin usually appear about the same time. The patients are often persons debilitated by the use of alcohol or otherwise. The gummata were mostly preceded by a non-condylomatous iritis with occlusion of the pupil. The increased pain, lower tension, and decline of sight indicate an extension of the iritis backward. The sclera then bulges and later perforates, allowing a yellowish mass to escape under the conjunctiva. In one case V = $\frac{1}{6}$ was ultimately obtained, in another sight was lost from detachment of the retina, and in a third enucleation was required. Calomel injections seem to be preferable to iodide of potassium and mercurial ointment. v. MITTELSTÄDT.

According to HIRSCHBERG (446) iron splinters in the eye usually cause a rusty discoloration of the iris in a year or two, and later a dotting of the posterior surface of the cornea with orange-colored points. This punctate deposit he has seen only with foreign bodies, never after hemorrhage, the iris in the latter case becoming green. He cannot acquiesce with v. Hippel's view that this greenish-yellow discoloration also occurs when there is a splinter of iron in the eye. A third sort of discoloration is a yellowish one due to inflammatory changes. His points were illustrated with some case histories.

XIII.—CHOROID.

447. HOFSCHLÄGER. Two noteworthy cases of metastasis from choroidal sarcoma. *Inaug. Dissert.*, Greifswald, 1896.

448. HIRSCHBERG. On the treatment of choroidal tumors. *Centralbl. f. prakt. Augenheilk.*, xx., p. 268.

449. PANAS. Choroidal sarcoma in the macular region with extension in the orbit. *Arch. d'opht.*, xvi., 8, p. 460.

450. PANAS. A rare tumor of the eyeball. *Ann. d'ocul.*, cxvi., p. 62.

451. MORAX. Spontaneous retro-choroidal hemorrhage with external ocular hemorrhage. *Ibid.*, p. 61.

452. VIGNES and BATUAUD. Irido-choroiditis of uterine origin. Irido-choroiditis plastica at the menstrual periods. Chronic glandular endometritis due to staphylococci. Rapid and permanent improvement in the irido-choroiditis after curetting the uterus. *Arch. d'ophth.*, xvi., p. 449.

453. DOR, L. Pathological study of a case of congenital syphilitic (?) choroiditis with hemorrhages in the retina from thrombosis of the central vein. *Ibid.*, p. 494.

454. MEYER. On the formation of colloid excrescences on the lamina vitrea. *Inaug. Dissert.*, Griefswald, 1896.

455. VAN DUYSE. A contribution to the study of coloboma of the eye. *Arch. d'ophth.*, xvi., 7 and 9, pp. 432, 573.

456. BULL, C. S. Panophthalmitis, orbital cellulitis, and subdiaphragmatic abscess. Autopsy. A possible case of metastasis *Annals of Oph. and Otol.*, July, 1896.

HOFSCHLÄGER'S (447) first sarcoma patient, a woman of twenty-six, had several attacks of pain and loss of sight in the right eye six years before. Recently there had been exophthalmus and a brown reflex could be seen through the pupil. Exenteration of the orbit was done. The ball contained a flat sarcoma, and on the outer surface of the sclera was a large tumor. Sarcoma cells were found in the optic nerve as far back as the chiasma, and at one point a metastatic nodule had formed in the inter-vaginal space.

The second patient, a woman of thirty-nine, had had an exenteration of the ball performed six years before, and had worn an artificial eye until a short time before, when the stump became enlarged and painful. A nodular reddish-yellow tumor was seen

covering the entire anterior segment of the ball. There was also a tumor as large as a cherry adherent to the bone below and external to the orbit. Exenteration of the orbit was done, and later a partial resection of the superior maxilla. Examination showed the tumor to be a sarcoma. The point of interest in this case was the involvement of the bony wall of the orbit.

HIRSCHBERG (448) reports three cases of enucleation for choroidal sarcoma in which experimental puncture had been made. If the needle is passed into a tumor pure blood is obtained, if the fluid beneath a detached retina is tapped, a fibrinous yellow liquid is obtained.

In PANAS'S (449) patient, a woman of fifty, a flat elevation appeared at the posterior pole of the eye, leaving the disc free. Three years later exophthalmus and glaucoma. After enucleation a small flat sarcoma of the choroid was found and also a larger tumor external to the sclera resting on the sheath of the optic nerve. A recurrence followed the operation. The choroidal tumor was a round-celled sarcoma, while the orbital part had more the structure of an alveolar endothelioma.

VIGNES (452) treated a woman of twenty-four for a frequently recurring irido-sclero-choroiditis of the left eye, which later came on also in the right eye, simultaneously with the menses. An endometritis was discovered, and curetting the uterus brought about a permanent recovery. v. MITTELSTÄDT.

DOR (453) found in the eye of an infant dying at birth, probably of hereditary syphilis, a great number of retinal hemorrhages in the periphery, probably due to thrombosis of the central veins. In one eye there was a choroidal white patch about the disc. The choroid showed some signs of inflammation.

v. MITTELSTÄDT.

In VAN DUYSE'S (455) cases there was a downward coloboma of iris, lens, and ciliary body, together with a choroidal coloboma involving the disc and macula in the right eye, and separated from a coloboma of the nerve sheath by a strip of normal choroid and retina in the left. A full microscopic description was given, with references to the literature of the subject.

BULL'S (456) patient, a man of forty, was admitted for panophthalmitis of right eye in connection with orbital cellulitis, apparently of idiopathic origin, which was treated in the usual way. A few days after, symptoms of general pyæmia became manifest, and soon a typical and intense form of pyæmic infection set in,

which ended in death at the end of about six weeks. At the autopsy a large abscess containing twelve ounces of pus was found under the diaphragm. A small mass of tissue represented the kidney on the left side, but it had no connection with the abscess. Liver enlarged, with a perityphlitic abscess passing through the right lobe; no peritonitis. Some changes found in the chest, in heart, lungs, and pleura, but the brain was free from any considerable abnormal changes. Right eye sunken, with micrococci in its interior and in the sheath of the optic nerve throughout its whole extent. They were like the staphylococcus pyogenes. BURNETT.

XIV.—GLAUCOMA.

457. TROUSSEAU. Notes on ophthalmology. *Ann. d'ocul.*, cxv., p. 418.

Of TROUSSEAU's (457) notes, those on the action of iridectomy in chronic glaucoma are particularly interesting. In ten cases of slowly progressive glaucoma with slight increase of tension, iridectomy was followed by an immediate more or less marked diminution of vision, and in two cases by complete loss of sight. The comparison of the two eyes of the same patient, one operated on and one not, is instructive. Of two such cases, in one vision was lost at the same time in both eyes, and in the other a year and a half earlier in the operated eye. In ten other cases operated on one eye only, the glaucoma progressed more rapidly after operation in two cases, and the acuteness of vision was diminished in all. SULZER.

XV.—SYMPATHETIC OPHTHALMIA.

458. RIVERS, E. C. A case of sympathetic ophthalmia. *Journ. of Eye, Ear, and Throat Diseases*, July, 1896.

In the case reported by RIVERS (458), a boy of eight was wounded in the left eye with a piece of percussion cap, which entered the eye through the cornea and did not involve the ciliary region. There was prolapse of iris. After some months, when the symptoms of irritation had subsided, the piece of cap was seen behind the iris and midway between the pupil and the periphery. It was removed, and the eye cleared up and gave rise to no annoyance. Four months later, eight months after original injury, there was an outbreak of iritis in the sound (right)

eye, which went on steadily to total loss of sight through iridocyclitis. The injured eye was enucleated a week after the outbreak of ophthalmia in the sound eye. BURNETT.

XVI.—LENS.

459. ALBRAND. Report of 295 cases of cataract operation in Professor Schoeler's clinic in Berlin. *Arch. f. Augenheilk.*, xxxiii., 2, p. 71.

460. HIRSCHBERG. On the treatment of contaminated cataract. *Deutsche med. Wochenschr.*, No. 27, 1896.

461. FROMAGET and CABANNES. On expulsive intra-ocular hemorrhage after the extraction of cataract. *Ann. d'ocul.*, cxvi., p. 118.

462. CRAMER. A case of lenticonus posterior. *Zehender's klin. Monatsbl.*, xxxiv., p. 278.

463. DE SCHWEINITZ. Concerning the extraction of immature cataract with reports of cases. *Ophth. Record*, June, 1896.

464. MILES, H. S. A number of lens cases illustrating heredity. *Annals of Ophth. and Otol.*, July, 1896.

ALBRAND (459) states that 144 extractions were done with iridectomy and 151 without. He describes the operative procedure, and says that no attention need be paid to remaining cortical masses. The many accidents occurring in extraction without iridectomy have led to the return to the old operations. Simple extraction, 151 cases; suppuration in 2, prolapse of iris in 10, and of vitreous in 6. Combined operation, 144 cases; suppuration in 2 cases, prolapse of vitreous in 7.

By contamination cataract, HIRSCHBERG (460) means such cases as would be infected by the tear sac or conjunctiva after extraction. In blennorrhœa of the sac he neither splits the anterior wall of the sac nor extirpates it, but he cauterizes the lachrymal canaliculi, closing them near the puncture when there is merely lachrymation, and closing them down to the sac when there is marked blennorrhœa. The extraction must be put off for a month.

FROMAGET and CABANNES (461) examined two eyes in which during extraction there had been hemorrhage that could not be checked. The source of the bleeding was a ruptured choroidal vessel. SULZER.

In CRAMER's (462) case the refraction through the margin of the lens was + 3. D, and through the centre — 11. D. He supposes that in fœtal life there had been an increased formation of fibres in this part.

DE SCHWEINITZ (463) reports twelve cases of immature cataract in patients from twenty-seven to seventy-five years old successfully extracted. He uses the simple, the combined method, or the preliminary iridectomy according to the requirement of the particular case. He does not favor any procedure for ripening.

BURNETT.

MILES (464) gives a history of heredity of lens dislocation in a family of eight children in whom six had dislocation in both eyes. The mother was the parent affected. There were three males and three females affected ; one male and one female escaped. The luxations were mostly in the downward direction or laterally ; none directly upward. BURNETT.

XVII.—VITREOUS.

465. POLLOCK. A case of peculiar punctate opacity of the vitreous. *Beiträge zur Augenheilk.*, xxiv., p. 81.

POLLOCK (465) reports the case of a patient with obscurations of sight and haloes in the prodromal stage of glaucoma, there being visible in the vitreous a great number of light milky-colored fixed spherules of obscure origin. These were not cholesterin crystals.

XVIII.—RETINA AND FUNCTIONAL DISTURBANCES.

466. PRETORI. A case of peculiar pigmentation of the fundus. *Beiträge zur Augenheilk.*, xxiv., p. 101.

467. SCHLOSSER. On atrophy of the retina after gray degeneration of the optic nerve and after embolism of the central artery. *Inaug. Dissert.*, Jena, 1896.

468. NUEL. Alterations of the macula lutea (continuation and end). *Arch. d'opht.*, xvi., 8, p. 473.

469. NUEL. Alterations of the macula lutea. *Ibid.*, p. 479.

470. NATANSON. On chorio-retinitis striata and spontaneous recovery from detachment of the retina. *Zehender's klin. Monatsbl.*, xxxiv., p. 335.

471. EHRLE. On embolism of the central artery. *Inaug. Dissert.*, Tübingen, 1896.

472. TÜRK. Remarks on thrombosis of the central vein, with pathological examination of a new case. *Beiträge zur Augenheilk.*, xxiv., p. 44.

473. JENSEN. On some new methods of treating detachment of the retina. *Med. Aarskrift*, 1896, p. 102, Copenhagen.

474. WOODRUFF, T. A. A case of thrombosis of the central retinal vein. *Annals of Oph. and Otol.*, July, 1896.

PRETORI (466) saw a group of whitish points about the macula resembling the changes of albuminuric retinitis, and about the disc, at ½ P D distance, a dark ring from which dark branched and anastomosing stripes ran out to the periphery of the fundus (angioid streaks). The author supposed this to be a congenital anomaly.

After stating the changes found in the retina after embolism of the central artery as described recently by Elschnig and Wagenmann, SCHLOSSER (467) reports on the condition of the retina in a case of tabic optic-nerve atrophy. The nerve-fibre layer was almost entirely wanting, as was also the layer of ganglion cells. The inner and outer reticular and nuclear layers, the rods and cones, and the pigment epithelium were unaltered. The changes in cases of embolism are much more extensive, the two reticular layers and the inner nuclear layer being considerably reduced, due to the disturbance in nutritive supply.

In NUEL'S (468) first case of retinitis circinata the macular region was occupied by a dark spot and on each side was a crescentic patch of white points, in some places isolated, in others confluent. In the second case the crescentic patches lay about a limited detachment of the retina. The detachment is preceded by an œdema of the retina. The peripheric white spots lie at the outer limits of Henle's fibrous layer, and are to be considered the transformation of albuminoid exudations. The rods and cones are normal. The process is probably not an inflammation but a degeneration due to arterio-sclerosis. Hemorrhages were not found. V. MITTELSTADT.

NUEL (469), having examined the retina and nerve in a case of intoxication amblyopia, and also in cases of blindness brought on in animals by the administration of male fern, concludes that the so-called retrobulbar neuritis or intoxication-amblyopia is caused by a destruction of the ganglion cells about the macula, and a

consecutive ascending simple atrophy of the nerves, to which may be added later a partial interstitial inflammation of the nerve.

v. MITTELSTÄDT.

NATANSON (470) adds another observation to those reported by Caspar. The chief characteristics of the affection are the appearance of long, narrow, white stripes and broad bands of pigment beginning near the disc, and extending out into the periphery. The entire picture owes its origin, according to the author, to a spontaneous recovery from retinal detachment.

EHRLE (471) records twenty-one cases of embolism. In fifty per cent. there were disturbances in the circulatory apparatus, and in an equal per cent. the optic nerve became atrophic. Total embolism was more frequent than partial.

After giving a résumé of the cases previously reported of thrombosis of the central vein, TÜRK (472) describes a case seen in a man of sixty-one. Apart from a reddened and blurred disc, and numerous hemorrhages and white spots in the retina, it was noticeable that the veins were not tortuous but rather diminished in calibre. Since no disease of the walls of the veins was found by microscopic examination, on the ground of the endocarditic changes and the irregularity of the pulse, the thrombus was supposed to be marantic. The venous disturbance led to an excessive destruction of the retina through œdema, profuse hemorrhages, and sclerotic hypertrophy of the nerve fibres. The tension was not increased.

JENSEN (473) gives a résumé of the different theories and methods of treatment of detachment of the retina. After referring to Deutschmann's injection method, he describes the treatment used two years ago by Dr. Bjerrum in Hansen Grut's clinic in Copenhagen. The subretinal fluid is first aspirated, and purified air is then injected into the vitreous. The reaction was slight, and in both cases in which it was tried a marked improvement followed. SCHIÖTZ.

WOODRUFF'S (474) patient, a man of forty-eight, with no disease of the heart or kidneys, was troubled with temporary obscuration of vision in the left eye, lasting for an hour or so, for several days, when it became permanent, with an acuteness reduced to $\frac{20}{100}$. The ophthalmoscope revealed an enormously enlarged disc with dilated and tortuous veins, and narrow arteries with some hemorrhages. The author deems the phenomenon due to an inflammation of the central retinal vein leading to its occlusion. BURNETT.

XIX.—OPTIC NERVE.

475. STRAUB. Demonstration of three patients. *Nederlandsche Oogheelkundige Bydragen*, 1896, 2d Aufl., p. 46.

STRAUB (475). A patient with papilla alba, the arteries appearing as white cords in which, when highly magnified, a fine red line can be seen. The case was one of marked endarteritic changes. WESTHOFF.

XX.—INJURIES, FOREIGN BODIES (PARASITES).

476. SCHÜTZ-HOLZHAUSEN. On extraction of bits of iron from the interior of the eye by means of the electro-magnet. *Inaug. Dissert.*, Strassburg, 1896.

477. SCHULTES. Magnet operations on the eye. *Inaug. Dissert.*, Kiel, 1896.

478. HOOR. Contributions to ophthalmology. Four clinical reports. *Wiener med. Wochenschr.*, 34 and 35, 1896.

479. RODEWALD. Three cases of injury of the eye by a bird's beak. *Inaug. Dissert.*, Kiel, 1896.

480. WILLGEROTH. On subconjunctival rupture of the eyeball. *Inaug. Dissert.*, Jena, 1896.

481. THOMALLA. On protection against eye injuries and diseases in factory employés and stone-workers. *Allg. med. Centralzeitung*, 1896, No. 80.

482. SCHWARZ. A case of eyelash in the anterior chamber and the histological changes due to it. *Beiträge z. Augenheilk.*, xxiii.

483. LEITZ. On the phlogogenic action of silver globes when left for years in the scleral cavity after exenteration. *Inaug. Dissert.*, Jena, 1896.

484. WILLARD, L. M. Removal of a splinter of steel from the vitreous chamber with an improved magnet. *Annals of Ophth. and Otol.*, July 1896.

SCHÜTZ-HOLZHAUSEN (476) reports in detail on 46 cases from Mayweg's clinic. In 6 cases of foreign body in the anterior segment of the eye, magnet extraction was successful in 5. In 40 cases of foreign body in the posterior segment, the results differed according to the magnet used. Of the attempted extractions with Hirschberg's magnet, 30% were successful; of those with Haab's

magnet, 78%. In a total of 46 cases, V = $\frac{1}{10}$ or better was secured in 10. Mayweg's method is to make a scleral incision near the foreign body, and then bring in contact with the eye a Haab magnet, which is suspended from the ceiling.

SCHULTES (477) gives an historical résumé of the literature regarding Hirschberg's electro-magnet, Haab's giant magnet, and Asmus's sideroscope. Haab recommends placing the magnet at the external wound; Schmidt-Rimpler, when the lens is uninjured, at the periphery of the iris, so that the foreign body may be drawn through the ciliary process into the anterior chamber; and Schlosser removes the foreign body through a meridional scleral incision. In two cases even Haab's magnet did not remove the foreign body.

HOOR (478) reports, first, a case of copper-splinter in the ciliary region, that was spontaneously extruded after two months, with final recovery. His second case was one of congenital aniridia and mixed nystagmus. The third was a successful attempt to prevent the readhesion of the raw surfaces in symblepharon operations. His last case was one of luxation of the lens, chronic iridocyclitis, sympathetic ophthalmia, enucleation, and recovery.

RODEWALD (479) records 3 cases of injury of the eye from a bird's beak. The remarkable fact brought out was that, although one would not consider such injuries antiseptic, recovery ensued even in the cases of severe and extensive injury.

WILLGEROTH (480), who observed 7 cases of subconjunctival rupture of the eyeball, confirmed the general opinion that such ruptures usually represent a direct, and rarely an indirect, bursting of the sclera; mostly without rupture of the conjunctiva. Hyphæma was always observed, and was often slow to be absorbed, and in 1 case was recurrent. The coloboma of the iris did not always correspond to the scleral rupture. In 2 cases the lens remained in position, in 3 it was luxated into the vitreous, and in one case it lay under the conjunctiva. In only one case was V = $\frac{1}{3}$ 3 years after the injury. Detachment of the retina followed in three cases. The prognosis as regards sight is bad.

THOMALLA (481) describes a protecting glass in which the lens is replaced by Schering's gelatoid.

In 3 patients, who had worn silver globes in the exenterated eyeballs, LEITZ (483) was able to confirm Leber's results of experiments on animals, viz., that many metals, even when aseptically introduced into the eye, eventually produce inflammation

from the chemotacric action of the dissolved metal. In from 2 to 5 years, signs of inflammation and increased sensibility of the eye came on, with headache, nausea, and fever, necessitating the removal of the globe. Microscopically, evidences of recent inflammation were found, and also inflammatory membranes of much older date.

In WILLARD'S case (484) the foreign body, a long crooked piece of steel, passed into the eye through the ciliary region and lodged in the retina just below and internal to the disc, where it could be plainly seen with the ophthalmoscope. A magnet was extemporized from a three-cornered file, and the electricity from a railway dynamo. The eye was entered at the upper edge of the external section, and 12 *mm* back from the sclero-corneal margin, the progress of the magnet being watched through the pupil with a head mirror. It was removed successfully, but in 10 days a cyclitis set up, and the eye had to be removed.

BURNETT.

XXI.—OCULAR AFFECTIONS IN GENERAL DISEASES.

485. HOFFMANN. On the simultaneous development of optic-nerve and spinal-cord inflammations. *Meeting of South-Western German Neurologists and Alienists at Baden-Baden*, June 6 and 7, 1896.

486. KUHN. On some disturbances of the ocular muscles in disseminate sclerosis. *Rec. d' opht.*, 1896, p. 326.

487. KUNN, K. On ocular-muscle disturbances in multiple sclerosis. *Beiträge z. Augenheilk.*, xxiii.

488. SACHS. On secondary atrophic processes in the nuclei of origin of the ocular nerves. *Graefe's Arch.*, xlii., 3, p. 40.

489. CORREO DE BITTENCOURT. On ocular disturbances in beri-beri patients. Rio de Janeiro, 1896.

490. JANUSKIEWICZ. Two cases of puerperal septic embolism of the eye. *Centralbl. f. prakt. Augenheilk.*, xx., p. 206.

491. DE WECKER. Obstetrical ocular lesions. *Ann. d'ocul.* cxvi., p. 46.

492. HÜBNER. Three cases of ocular disease in ichthyosis hystrix. *Beiträge zür Augenheilk.*, xxiii.

493. FRANKE. A case of acromegaly with temporal hemianopsia. *Zehender's klin. Monatschr.*, xxxiv., p. 259.

494. Pick. On hemianopsia in uræmia. *Prager med. Wochenschr.*, 1895, No. 45.

495. Bossolino. On hemianopsia and unilateral ophthalmoplegia of vascular origin. *Neural. Centralbl.*, xv. p. 626.

496. Armaignac. Bi-temporal hemianopsia, double atrophy of the papilla ; tuberculosis of the base. *Ann. d'ocul.*, cxv., p. 471.

497. Brückner. A case of bilateral homonymous hemianopsia, with preservation of a small visual field, following a complicated fracture of the skull in the occipital region. *Inaug. Dissert.*, Giessen, 1896.

Hoffmann (485) reports three cases of blindness and paralysis of the legs. A man of forty-eight, grew blind within a few hours and died ten weeks later. The autopsy showed retrobulbar neuritis and disseminate myelitis. A woman of fifty-six, grew blind within a week with optic neuritis. On the 14th day there came on motor and sensory paralysis of the legs, and paralysis of the bladder and intestines. The autopsy revealed transverse dorsal myelitis. These cases may be called ancephalomyelitis disseminata.

Kunn (487) has found some new eye symptoms in multiple sclerosis. The first in an inability to rapidly fix a new object, the eyes alternately converging for a nearer and a farther point, due to the fact that the synergetic action of the internal recti is not carried out with the necessary precision. Second, he mentions a strabismus due not to paralysis but to a disturbance of co-ordination in the extrinsic muscles. Third, he speaks of anisocoria. He several times observed a sudden dilatation of the pupil following the irregular twitching motion described by Parinaud.

Sachs (488) records these observations. 1. A case of exenteration of the orbit for glioma in a child aged two years. Death two months later. 2. Paralysis of the abducens in a man of eighty-three with two fungi of the dura mater. 3. Recurrent paralysis of the abducens in a woman of sixty-two. The consecutive atrophy of the nerves and the cerebral nuclei was especially studied.

de Bittencourt (489) after a long experience with beri-beri in Brazil, speaks of the ocular-muscle paralyses, which are usually of short duration. His conclusions as to the visual disturbances are as follows : In beri-beri neuritis, only the periphery of the

nerve is affected (peri-neuritis). Occasionally there may be some hypertrophy of the interstitial connective tissue. The complete restoration of vision even after long-continued amaurosis, and the lack of fatty degeneration and atrophy of the nerve-fibre bundles, indicate that the affection is not a parenchymatous or axial neuritis. In amaurosis and amblyopia, the swelling may affect the optic nerves alone, or also the chiasm, tracts, and visual centres.

JANUSCKIEWICZ (490) reports on a case of unilateral and one of bilateral metastatic embolism in puerperal fever. Both patients lived.

DE WECKER (491) reports the case of a new-born infant whose left orbit was emptied by the finger of the obstetrician, who thought that his finger was in the infant's mouth. A more frequent accident is muscular paralysis caused by the forceps. The external rectus is usually the muscle affected. The condition is not noticed until the infant is older, when a convergent squint is observed which, as most infants are hyperopic, is taken to be a convergent squint due to hyperopia.

It is also probable that the forceps plays a certain rôle in the production of congenital ptosis.

De Wecker has seen three cases of corneal opacity caused by the direct pressure of the forceps, the diagnosis being made possible by the pressure-mark left on the forehead. These opacities clear up spontaneously. SULZER.

HÜBNER (492) records three cases showing that ichthyosis may cause ectropium of the lower lids by shrinking of the skin, and that it may also cause shrinking of the conjunctiva and obstinate keratitis.

FRANKE'S (493) patient, a woman of thirty-one, soon after cessation of the menses, noticed diplopia and an increase in the size of the face, feet, and hands. These parts continued to grow so that three years later the clinical picture of acromegaly was well marked and bitemporal hemianopsia developed. Two years later there were thickening of the lids, and paralyses of the right internal and inferior recti. R V = $\frac{8}{10}$, L V = $\frac{7}{10}$. Sharp bitemporal hemianopsia without hemianopic pupillary reaction. Atrophy of the optic nerves. Thyroid tablets had no effect, but beef hypophyses caused a subjective improvement. The decay of vision is due to disease of the hypophysis, and vision is usually completely lost.

In an old nephritic patient, PICK (494) found uræmic amaurosis with preserved pupillary reaction. After the amaurosis had lasted one day, there was left hemianopsia. At the autopsy a focus of softening was discovered in the cortex at the outer side of the second occipital convolution. The uræmic poison was supposed to have caused coagulation within the vessels, producing a circumscribed softening.

BRÜCKNER (497) records a case of bilateral hemianopsia in a miner of twenty-one, who was struck with a stone in the occipital region. The skull was fractured, and the patient became entirely blind. A month later $V = \frac{6}{9}$. An examination of the field revealed in the right eye a total defect of the temporal half and of the inferior nasal quadrant, and in the left eye of the nasal half and the inferior temporal quadrant. There were no disturbances of color-sense or of orientation. In most of the cases previously reported the hemianopsia was at first unilateral and later bilateral, indicating two distinct lesions. In this case the hemianopsia was bilateral from the beginning, indicating an affection of both central optic paths by the single injury. As in the other cases, the point of fixation was free in this case, and central vision was therefore normal. For this reason most authors have accepted the view of Forster, who believed the preservation of the point of fixation to be due to a particularly favorable vascular supply to the point of sharpest vision in the occipital cortex, in opposition to Sachs, who claimed that each hemisphere stands in relation with the entire macula.

BOOK NOTICES.

I.—**Die Farbenblindheit u. ihre Diagnose** (Color-Blindness and its Diagnosis). For Physicians and Officials. By Dr. M. OHLEMANN, Eye Surgeon in Minden, Germany. Braunschweig: J. H. Meyer, 1897. Bound, 50 cents.

This brochure of 18 small-octavo pages is a short presentation, entirely for practical purposes, of the nature and diagnosis of the defects in color-perception. It contains a very well executed colored plate of the distribution of colors in the spectrum, as perceived, 1, by the normal eye; 2, by the so-called red-blind; 3, by the so-called green-blind; 4, by the totally color blind; showing graphically the defects in the different varieties of color-blindness, compared with the normal spectrum. The spectrum of the totally color-blind is composed of the shading of white and black, being white near the centre, the part of greatest brightness in the spectrum, from which it grows progressively darker towards both ends. Red- and green-blindness are the common defects; blue-yellow blindness may, as a rule, be omitted, as it occurs only extremely seldom, and the results of the examination of it have not proved uniform. The different methods of examination are briefly but clearly described. The author thinks that Daae's plate and Seebeck's test with worsteds, or a modification of it, as by Holmgren or Thomson, are sufficient for all practical purposes. H. K.

II.—**A Handbook of Diseases of the Eye and their Treatment.** By HENRY R. SWANZY, Dublin. Sixth Edition. Phila.: P. Blakiston, Son, & Co. From the sixth English Edition (London: H. K. Lewis). Price, $3.

Swanzy's text-book has been carefully revised. To gain space the description of "some elementary optics" has been omitted. The ocular manifestations in focal and diffuse diseases and in-

juries of the brain and spinal cord, and the functional diseases of the eye, further the diseases of the orbit and neighboring cavities, have received greater attention than before. Swanzy's book deserves its continued popularity. H. K.

III.—**Klinischer Leitfaden der Augenheilkunde** (Clinical Guide of Ophthalmology). By JUL. V. MICHEL, Prof. WÜRZBURG. Wiesbaden: J. F. Bergmann, 1897.

In three years a second edition has been necessary. It is increased by 34 pages, carefully revised, and brought up to date. It contains in its compact form an unusually thorough presentation of the present status of ophthalmology both in its scientific and practical aspects.

The reviewer, not a novice in eye surgery, is delighted with the concise style of the author and the extent of information his book imparts in so small a compass. He has, however, his doubts whether such condensation is the best thing for a beginner. What the adept comprehends at a glance, may be hard labor for the tyro. More elaboration of description, and demonstrations illustrated by drawings, would, in our opinion, have assisted the student greatly, even if the book were exclusively designed to supplement the all-important clinical teaching. H. K.

IV.—**Technique de l'Exploration Oculaire; Introduction à l'Étude de l'Ophtalmologie.** Par L. VIGNES. Paris: A. Maloine, 1896.

Vignes's book of 418 octavo pages, with 213 figures in the text, is an excellent introduction to a thorough, scientific study of ophthalmology. It treats in an elementary way, but with sufficient detail, of the preliminary branches of ophthalmology, namely:

1. Anatomy of the visual organ, including embryology.

2. General and special physiology of the eye. Physical and physiological optics are exhaustively and clearly presented. The methods of functional examination are well described. The diagnosis of the anomalies of refraction and motility is based on the application of theoretical knowledge to the requirements of practice. The book is warmly recommended to all those that know French. The style is clear and easy. H. K.

V.—**Augenärztliche Unterrichtstafeln.** Edited by Prof. H. MAGNUS. (Plates for Ophthalmological Instruction.) No. X. The Structure of the Human Retina. By Dr. RICH. GREEFF Berlin. Breslau: I. U. Kern, 1896.

The plates, with a didactic exposition of the subjects they illustrate, edited by Prof. Magnus, are very valuable for students and teachers. The last of the ten numbers that have appeared thus far is particularly opportune. The structure of the human retina has received a new impetus by the remarkable discoveries which the recent methods of microscopic research by Ehrlich, Golgi, and Rámon y Cajal have made possible. The monograph of Dr. Greeff presents the actual status of the histological anatomy on 4 plates and 19 pages of text, systematically arranged. It will certainly be welcome to many of our readers who, as the reviewer, want to inform themselves of the scientific progress in this field. In the large plate Dr. Greeff places the earlier description of the retina by Hy. Müller and Max Schultze at the side of the recent description by Rámon y Cajal, so that we readily notice what has been modified and added by the brilliant researches of the ingenious Spanish investigator. After a short description of the topographical anatomy of the retina, the author traces the course of the rays of light through the depth of the retina according to the knowledge obtained by previous and recent researches. Then he gives a detailed description of each retinal layer. After that he describes the sustentacular tissue, the macula lutea and fovea centralis, the peripheric (ora serrata, ciliary and iridic) parts, and the vessels of the retina.

Particularly interesting and clearly illustrated by the large Plate I. are the three sets of neurons (independent nerve formations), which, according to Rámon y Cajal, transmit the light impression from one set to the other through contact of its terminal (dendritic) structures, not through an uninterrupted nerve fibre, which has so long been sought for in vain. H. K.

Contents of the Newest Number of the Arch. für Augenhk.

Vol. XXXIV., No. 2 (3 plates and 7 text-figures). Issued February, 1897.

VI. L. Bach. Bacteriological investigations on the influence of antiseptic applications on the pressure of germs at the edges of the lids and in the conjunctival sac.

VII. Liebrecht. On physiological and hysterical diplopia.

VIII. N. Andogsky. On the ganglion cells in the iris.

IX. C. GRUNERT. On the tuberculosis of the conjunctiva.

X. W. GOLDZIEHER. Hutchinson's alteration of the background of the eye (Retinitis circinata, Fuchs).

XI. H. GIFFORD. Fränkel's pneumonia diplococcus a frequent cause of acute conjunctival catarrh. (Translated by the author from the English edition.)

Systematic report on the progress of ophthalmology during the 3d quarter of 1896. Translated in this number.

ARCHIVES OF OPHTHALMOLOGY

NOTICE TO OUR READERS.

The ARCHIVES OF OPHTHALMOLOGY contain *original papers* on all branches of ophthalmic surgery, and *original reports* on the progress of ophthalmology. The original papers occupy from two thirds to three fourths of the space, and their scope embraces all subjects of scientific and practical interest connected with this department of medicine.

The object of the ARCHIVES is to guard, solidify, extend, and diffuse the stock of acquired ophthalmic knowledge by recording the constant addition of new observations, investigations, methods and means of examination, clinical experience, instruments and remedies, and further by taking part in the discussion of the questions of the day with a spirit alike conservative and progressive.

Particular attention is paid to the preparation of the Report on the Progress of Ophthalmology. The report is intended to furnish a *complete, systematic, and early* review of the current ophthalmological literature of the world. It has been necessary to divide the work of its preparation among a number of collaborators according to the following arrangement:

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1. *General Ophthalmological Literature:*
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   c.—Periodicals on our specialty (short notices of their character, time and place of publication, the titles of the original papers, with the names of their authors).

2. *General Pathology, Diagnosis, and Therapeutics*, including new instruments, apparatus, and remedies.
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7. *Injuries and Foreign Bodies of these parts.*

Dr. P. SILEX, Lecturer at the University of Berlin.

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2. *Refracting Media*, including the lens.
3. *Retina and Optic Nerve.*
4. *Injuries and Foreign Bodies of these parts.*
5. *Ocular affections in connection with general diseases.*

In order to obtain complete and recent reviews on the non-German ophthalmological literature, special reporters have been selected for different countries, who will send monthly abstracts of all local ophthalmological publications to Dr. C. Horstmann, of Berlin, the editor of the Report. Dr. Horstmann will distribute these abstracts among the German reporters according to the above plan, in order to preserve the systematic arrangement which we think of paramount importance.

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For Germany: Drs. BERNHEIMER, Vienna, HORSTMANN, SILEX, and DEUS, in Berlin.

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For Russia: Prof. HIRSCHMANN, Charkow.

For Scandinavia: Drs. OLE BULL and SCHIÖTZ, Christiania.

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In the interest of our readers, who are scattered over the whole world—and whom, like ourselves, we desire to keep informed of all advances in ophthalmology,—furthermore in their own interest, authors of ophthalmological works are requested to send reprints, duplicates of journals, or copies for reviewing, to one of the above-named reporters, or to the editors or publishers of the Archives, according to their convenience.

The abstracts of American ophthalmological literature formerly appeared under a special head, but are now embodied in the systematic Report. Text-books may be specially noticed.

The number of good papers offered us for publication has increased to such an extent that it is no longer possible to translate all of them unabridged. Whenever a German paper is condensed in the English version, or *vice versa*, it will be so stated. Should any one of our readers wish to recur to the original, the editors will always take pleasure in sending it for reference.

Under the heading of "Miscellaneous Notes," there will be published all kinds of professional news which specially concern the oculist, *e. g.*, appointments, honors, resignations, vacancies, new ophthalmic hospitals, opportunities for instruction, prize questions and essays, announcement of Society meetings, etc. Brief notices of this kind will be thankfully received by the editors.

Original papers of value from any source will, as heretofore, be welcome to the ARCHIVES, and are solicited.

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The editors and publishers of the ARCHIVES beg to offer some suggestions to authors who propose to favor them with their contributions.

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4. Authors may receive proofs for revision if they will kindly return them without delay. We beg however to remind our contributors that changes in the copy are equivalent to resetting, causing so much additional expense. We therefore request them, to make, if possible, no alterations at all in their MSS., or, at least, to limit these to what is of essential importance.

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